

Jean Monnet Chair Conference Proceedings in Risk and Crisis Communication in the EU

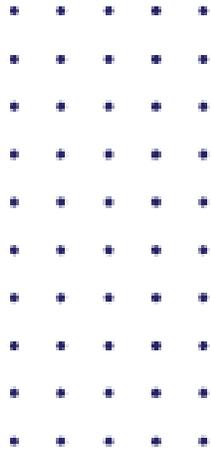
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Risk and Crisis Communication in the European Union





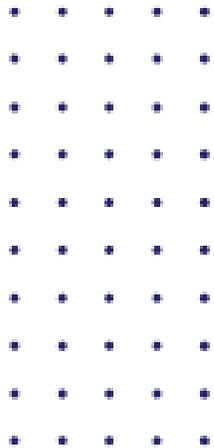
JEAN MONNET CHAIR
Risk & Crisis Communication in the EU



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Foreword to the Volume

Amalia Triantafillidou

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The first volume of the “*Risk and Crisis Communication in the EU*” proceedings brings together a collection of interdisciplinary studies on risk and crisis communication across diverse European contexts and a range of crisis and disaster types. This volume focuses on the roles of various crisis stakeholders, the communication practices of organizations and governmental bodies, and the influence of both traditional and digital media in shaping the evolving landscape of crisis communication.

The idea of this volume originates from the Jean Monnet Chair Program (2022-2025) on Risk and Crisis Communication hosted at the Department of Communication and Digital Media of the University of Western Macedonia. The Chair aims to build a cumulative knowledge on the way communication in times of crisis and disaster unfolds by various European crisis stakeholders such as EU organizations and agencies, state authorities, public figures, media organizations, NGOs, and citizens. More specifically, the Chair - and consequently this volume - tries to raise awareness on crises and risks faced by Europe; the ways European Union, member states, and other organizations in Europe have responded to various crises such as natural disasters, tourism crises, health related disasters, and migration crisis; generate insights about how new technologies and social media can be used as effective means for crisis communication by European crisis stakeholders at all levels from EU agencies, to state authorities and citizens; and identify best crisis communication practices at all phases of crisis management (prior, during, and after) supporting a European model of crisis communication,

Finally, the Chair and the Jean Monnet Chair conference adopts an interdisciplinary approach by drawing on diverse theories and methods (management, crisis communication, public relations, journalism, framing theories, psychology, anthropology, political science, and information technology) encouraging the debate among the academic community, state authorities representatives, EU officials, crisis communication professionals, journalists, civil servants, policy makers, NGOs, citizens, and volunteers on how crisis stakeholders can communicate during crises and disasters to increase coordination between authorities, to alert, to enhance crisis self-efficacy, to reduce risk, to avoid reputational damage, and ultimately build community resilience. Thus, common approaches, best practices and areas for improvement can be identified.

Driven by this Jean Monnet Chair’s core focus, the proceedings consist of eleven papers presented during the online conference entitled “*Risk and Crisis Communication in the EU*,” held in Kastoria,

Greece, on 29–30 December 2024. The conference was organized by the Jean Monnet Chair of the Department of Communication and Digital Media at the University of Western Macedonia (2022–2025). Participants of the conference included academics, researchers, and practitioners from various European countries, such as Italy, Portugal, Turkey, Hungary, Norway, and Greece. The keynote speaker was Audra Diers-Lawson, who delivered a presentation entitled “*Be EPIC to Mitigate Risk: Learning from Communication Successes and Failures to Improve Citizen Engagement.*”

In her keynote speech, she analyzed and compared public health communication during the COVID-19 pandemic between the authorities of the UK and Scotland. Moreover, she presented data from 11 European countries on public communication related to COVID-19 and derived valuable practical implications for practitioners concerning risk communication.

The volume is organized around three major thematic sections, namely: Risk and Disaster Communication: A Stakeholder approach; Media communication during disasters and emerging technologies; Online and Social Media Crisis Communication.

Section 1: Risk and Disaster Communication: A Stakeholder Approach

The first thematic section consists of four papers that shed light on the theoretical underpinnings that have driven risk communication research and address issues of risk and disaster communication from the perspective of young citizens and vulnerable groups. Moreover, this section explores a different type of crisis, that of tourism crisis in Greece and offers insights on effective risk management practices of tourism companies.

In the first paper “*The Role of Media and Communication Research in Risk Communication*”, Alessandra Massa and Fransesca Comunello from the Department of Communication and Social Research of the Sapienza University of Rome, conducted a scoping review of the international literature in risk communication and revealed the key theories and conceptual tools utilized by researchers to understand contemporary risk communication such as communication models, risk perception models, public relations and organizational communication theories, social movement and collective action theories. The paper discusses critical gaps and areas for further investigation in risk communication research.

In the second paper “*Vulnerable Publics in the 2023 earthquake disaster: A Study of Communication Centered Experiences of Persons with Disabilities*”, Pınar Özdemir, Melike Aktaş Kuyucu, and Uğur Aksoy from the Department of Public Relations and Publicity of the Ankara University, present the findings from the qualitative study on the experiences of vulnerable citizens with respect to risk and disaster communication in the aftermath of the two devastating earthquakes that hit Türkiye on February 2023. Through their study they identify important risk communication challenges and barriers that vulnerable groups such as people with disabilities face such as inaccessibility to risk information and lack of participation in disaster preparedness processes.

The third paper entitled “*Educated Youngsters’ Risk Perception and Seismic Preparedness – Lessons for Crisis Communication in the Case of Earthquake-Prone Greece*” by Anna Fokaefs and Kalliopi Sapountzaki from the Department of Geography of the Harokopio University of Athens

examines risk perceptions of Greek university students in regard to the earthquakes and their level of preparedness. Through an online survey, it was shown that young Greek university students are mainly reacting to earthquakes rather than engaging in protective actions. Moreover, motivations for protective actions are related to psychological factors, prior experiences with earthquakes and emotions of students. Online sources are important channels of earthquake related information utilized by young citizens in Greece. Important implications are derived for risk and disaster communicators dealing with seismic risk communication.

The fourth paper of this section “*Exploring the Crisis Behind the Employee Experience (EX) in the Greek Hotel Sector: Preliminary Findings from a Qualitative Study*” by Georgia Papadopoulou from the Agora Market and Consumer Behavior Laboratory of Athens University of Economics and Business and Anastasios Koukopoulos from the ELTRUN – The E-Business Research Center of Athens University of Economics and Business, examines a different type of crisis, the tourism crisis of the Greek hotel sector due to the low workforce response, which in turn damages the reputation of the Greek tourism services. Using qualitative research design, the authors aim to explore how employee experience contributes on the escalation of the tourism crisis. Moreover, the paper provides important insight from a risk management perspective to prevent and better prepare the hotel sector from similar crises in the future.

Section 2. Journalism in Turbulent Times: The Role of the Media During Crises

The second thematic section consists of three studies that examine local journalistic practices during disasters, the effects of disaster media coverage on young audiences, and the impact of emerging technologies on crisis reporting..

The first paper “*Local Media, Local Disaster in a Post-Covid Era*” by Giacomo Buoncompagni from the Department of Political Science, Communication and International Relations of the University of Macerata, explores the role of local journalism in Romagna, particularly during the disaster caused by the 2023 floods. During the flood emergency, local newsrooms became vital connectors between citizens, authorities, and distant families, delivering timely, context-specific information despite technical hardships. The crisis emphasized the importance of proximity, trust, and advocacy in local journalism, with reporters prioritizing human stories and community resilience.

In the second paper “*Media Coverage of Disasters and Young Audiences: A Media and News Literacy Perspective*”, Katerina Chryssanthopoulou from the School of Journalism and Mass Communications of the Aristotle University of Thessaloniki, discusses the impact of disaster coverage on young audiences, such as children and teenagers. Drawing from a range of communication and media theories, as well as developmental psychology models, the paper analyzes how disaster news reporting affects young people and how youth are portrayed by the media during times of crisis. Furthermore, it offers important recommendations for journalists on how to report disaster-related news in a way that is appropriate and accessible for younger audiences. The paper also highlights the critical role of disaster news literacy in helping young citizens better prepare for future crises and strengthen their resilience.

The third paper “*Harnessing Augmented Reality, Crowdsourcing, and Big Data: Enhancing Collaboration and Responsiveness in Crisis Communication*” by Eleni Chalikiopoulou and Ioanna Eskiadi from the School of Journalism and Mass Communications of the Aristotle University of Thessaloniki, explores innovative media strategies in crisis reporting through three prominent case studies: Al Jazeera’s use of augmented reality (AR) during the 2017 Gulf Cooperation Council (GCC) crisis, the “Eyes on Russia” project by the Centre for Information Resilience (CIR) , and Al Jazeera’s integration of static maps into its daily news coverage of the Russia-Ukraine war. Each case illustrates how digital tools—augmented reality, interactive maps, and crowdsourcing data—enhance public understanding of complex socio-political conflicts. Collectively, these cases highlight how media organizations are increasingly adopting advanced visual tools to improve crisis reporting.

Section 3. Digital Crisis Communication and Audience Interaction

The third thematic section of this volume consists of four studies that examine how online tools such as websites and social media are utilized by disaster or emergency management organizations such as civil protection services in various European countries. Moreover, this section addresses the importance of social media for crisis communication of organizations and reveals how social media can be of value for organizations managing geo-political crises to enhance their employees’ resilience.

The first paper “*Organizational resilience in the digital era: leveraging social media platforms for Crisis Communication*” by Ana Mafalda Matias from the Department of Communication and Art of the Polytechnic University of Viseu (Portugal), Ezel Turk from the Department of Public Relations and Publicity of the Istanbul University (Turkey), and Ana Lopes from the Department of Communication and Art of the Polytechnic University of Viseu (Portugal), stresses the importance of crisis communication across the different crisis stages and the need for effective crisis communication tools for strengthening organizational resilience. The paper also introduces a coding model for categorizing crisis communication message strategies.

In the second paper, entitled “*Message Strategies of Emergency Management Organizations during Severe Weather Effects*”, Panagiotis Preventis and Amalia Triantafillidou from the Department of Communication and Digital Media of the University of Western Macedonia discuss the way three emergency management services (112.gr; the Fire Brigade (FB), and the General Secretariat for Civil Protection (GSCP)) in Greece utilize social media (X platform) during severe weather events. Using content analysis based on the Warning Response Model (WRM), 156 messages were examined for elements like threat description, protective guidance, location and timeframe details, source identification, and message framing. Findings show significant differences across organizations and provide recommendations to enhance public safety messaging during severe weather events in Greece.

The third paper by Charisios Kalampoukas from the School of Social Sciences and Humanities of the Western Macedonia University, entitled “*Civil Protection Online Communication: A Comparative Analysis of European Union Member States*” explores the online presence of civil

protection organizations in EU member states, focusing on website content and communication practices. Most websites emphasized organizational information and promoted social media, while fewer included critical elements like the 112-emergency number, disaster preparedness content, or accessibility features. The findings highlight the need for more consistent, inclusive, and informative online communication across the EU. Recommendations include standardizing content, improving accessibility, and enhancing crisis-related information.

The fourth paper by Kyriakos Tsiotas and Iordanis Kotzaivazoglou from the Department of Business Administration of the International Hellenic University, entitled “*Social media and personnel resilience: Insights from the 2020 refugee crisis in Greece*”, adopting an employee-oriented approach examines how social media interactions with other users affected the resilience of Greek security personnel during the 2020 refugee crisis in the Evros region. Surveying 237 security officers, it highlights the positive role of online social support and organizational identification in maintaining resilience. Findings offer insights for improving crisis communication and support mechanisms for frontline personnel during times of geo-political crisis.

The contributions in this volume demonstrate the critical role of effective risk and crisis communication in fostering trust and resilience. Anchored in the mission of the Jean Monnet Chair on Risk and Crisis Communication in the EU, this volume lays the groundwork for ongoing dialogue, research, and policy development. It is our hope that these proceedings will serve as a valuable resource for scholars, practitioners, and decision-makers committed to strengthening Europe’s capacity to communicate effectively in times of crisis. The journey continues in future volumes, as we collectively strive to build a more informed, connected, and resilient European crisis communication research.

Amalia Triantafyllidou,

Associate Professor

July 2025

***Risk and Disaster Communication: A
Stakeholder Approach***

The Role of Media and Communication Research in Risk Communication

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Abstract. This paper explores the field of risk communication through the lens of media and communication studies, adopting a sociological framework. It investigates how the methods and thematic concerns typical of media and communication research are applied to the study of risk communication by analyzing the findings of a scoping review of international literature on the applied dimensions of this field. The definitions and theoretical frameworks of risk communication reveal a limited but focused incorporation of concepts and tools from media and communication research. The review highlights several areas that warrant further exploration, including the development of more audience-tailored communication strategies, a renewed attention to the organizational dimensions of risk communication, and a more systematic application of classical media theories – such as agenda-setting and audience studies – to the analysis of risk-related discourse.

Keywords: risk communication, scoping review, communication theories, media

1. Introduction: considering risk communication in a complex media environment

This paper examines risk communication through the lens of media and communication theories. We explore how communication research methods and themes apply to studying risk communication, discussing findings from a scoping review of international literature on this topic. Conducted within the RETURN project², this review is part of a larger effort involving universities, institutions, and private partners to enhance knowledge of various risks.

Working on an interdisciplinary project has demanded considerable reflection, especially regarding the sociological contribution of media and communication studies to the field of risk

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² This study was carried out within the RETURN Extended Partnership and received funding from the European Union Next-GenerationEU (National Recovery and Resilience Plan – NRRP, Mission 4, Component 2, Investment 1.3 – D.D. 1243 2/8/2022, PE0000005).

communication, by integrating media analysis with broader social processes. Collaborating with a multidisciplinary team on a dynamic and complex topic such as risk communication has also posed several challenges. The first challenge pertains to *integration*, viewing communication as an element that necessarily interacts with other disciplinary resources. For instance, communicating natural risks requires understanding those risks and establishing cooperative relationships with experts whenever possible. The second challenge, by contrast, involves *differentiation*: it is necessary to establish boundaries regarding the practices, research strategies, theoretical tools, and interpretative approaches that define the discipline and distinguish it from related fields.

Then, a sociological approach to media and communication studies emphasizes the role of communication processes within all spheres of social life, including cultural, economic, and political dimensions.

This paper examines how the theoretical and methodological approaches developed within media and communication studies can contribute to a deeper understanding and more effective practice of risk communication. Rather than treating communication as a mere conduit – the so-called “last mile” in risk governance – this contribution draws on media and communication studies to unpack the symbolic, institutional, and strategic dimensions of how risk is communicated. When approached from a sociological perspective, media and communication studies offer valuable tools for framing risk communication as a set of socially mediated practices. Power relations, institutional logic, and cultural representations are deeply intertwined in these processes. Applying a sociological lens to media and communication studies enables us to critically examine these complex interdependencies and gain a deeper understanding of how risk is constructed, conveyed, and contested in society.

Acknowledging the communicative dimension in understanding risks and their perception entails validating (though not unconditionally) constructivist approaches, which highlight how some risks can be selectively amplified through visibility or cultural resonance. Treating communication as integral to the sociological study of risk allows the application of traditional fields of inquiry.

Studying risk communication – especially within today’s complex and constantly hybridized ecosystem – enables us to explore key dimensions for understanding the social domain and how material artifacts (media as infrastructures or mediating agents) shape representation, and thus influence understanding and perception.

Then, it becomes essential to integrate the following areas.

1. Communication as a social process: Investigating how communication contributes to constructing identities and social problems, fostering social cohesion, or amplifying the fractures characterizing social conflicts.
2. Structures of communication: Considering media as institutions capable of mediating and directing communication flows within societies. This perspective also considers media as apparatuses with specific organizational structures. Observing these structures enables the integration of production logic as socially and culturally situated phenomena, as evidenced by numerous analyses that describe the logic of media, journalism, and digital tools.
3. Communicative practices: Analyzing how individuals and communities produce, disseminate, and interpret messages. This analysis must account for “positionality” factors,

encompassing broader cultural milieus, social norms, and power disparities in content production and distribution.

4. The relationship between media and society: Examining the impact of broadcast or digital media on society. In this sense, media (including their material components as artifacts) and the representations they convey are considered significant for studying phenomena that affect public opinion, including transformations in the public sphere and democratic participation.

In this sense, risk communication can be interpreted as a cultural object, as defined by Wendy Griswold (1994) (see also Mangone, 2022). Like cultural objects, risk communication represents a shared meaning encapsulated in a form that owes much to social contingencies and media practices. However, it is also a form of communication in which relationships between creators and audiences are fundamental, involving essential dimensions such as trust (Renn & Levine, 1991; Bonfanti et al., 2023), credibility (Peters et al., 1997; Trumbo et al., 2003), and collaboration (McComas & al., 2020).

This analysis draws on a scoping review conducted to develop a database of tools and applications employed in risk communication. While the review primarily focused on operational tools and practices, it became evident that the underlying theoretical frameworks guiding these analyses and descriptions were not consistently grounded in media and communication studies. This observation led us to critically examine the extent to which concepts, theories, and classical analytical tools from media and communication research are essential for capturing the complexity of risk communication processes.

While this approach may seem recursive, the underrepresentation of communication disciplines as an interpretive tool, even for practical experiences, is worth discussing. Several hypotheses can be formulated. The first concerns *normalization*: even in such a specific field of study, references to the theoretical foundations of media and communication studies may be taken for granted as the scientific community shares them. The second hypothesis considers *fragmentation*: the phenomenon is being analyzed from so many perspectives that media and communication research struggle to establish as the protagonists of these analyses. Finally, the third hypothesis emphasizes the ongoing centrality of *expert knowledge*, which differs from that of communicators, who may only be involved in the final stages of the process. This suggests that the perspectives of the hard sciences and experts involved in risk governance are particularly relevant in developing the theoretical framework for risk communication.

This paper will discuss these hypotheses based on a large body of international literature. First, we will describe what we mean by risk communication. Next, we will briefly summarize the investigative techniques and findings of a scoping review, as described more extensively in Massa & Comunello (2024).

We will then discuss two aspects: risk communication definitions and which theoretical frameworks may be relevant for understanding contemporary risk communication. In the concluding section, we will draw together our arguments, outlining potential future research areas that could be strengthened through the cognitive tools of media and communication studies from a sociological perspective.

2. Risk Communication: An Overview

This paragraph examines the central role of risk communication within the broader framework of risk management. Rather than being treated as a peripheral or secondary component, risk communication should be recognized as a core element of policy development. Its effective implementation entails the establishment of dedicated spaces for dialogue and engagement with diverse publics. Such an approach is the outcome of an ongoing and complex process of negotiation among scholars, policymakers, and practitioners, aimed at fostering shared understandings and developing effective communicative practices.

Standard definitions describe risk communication as a “process of exchanging information among interested parties about the nature, magnitude, significance, or control of a risk” (Covello, 1992). This definition involves sharing details on the nature, extent, significance, and management of risks (Covello et al., 1986; Covello, 2021). The exchange concept enhances the understanding of risk communication as a relational process. From this perspective, messages that describe risks and the best practices to address them should foster a relational dimension rather than focusing solely on the transmission of information. This relational component, essential for turning risk communication into a genuine sharing of meanings, also impacts the content. Indeed, effective risk communication informs and educates the public, encourages protective behaviors, disseminates alerts, and facilitates collaborative problem-solving to address conflicts around risk management (Covello et al., 1986).

The interactive and discursive nature of risk communication – emphasized in most international guidelines – emerges from a broader process of innovation and a growing understanding of the dynamics that underpin it. Informed by ongoing research, contemporary practice has progressively moved away from *deficit-based models* (Hilgartner, 1990), which rely on unidirectional information flows. These earlier models assumed a structural asymmetry, particularly in terms of knowledge, between experts, policymakers, and the public. Within this framework, the public was positioned as a passive recipient of information, with little or no agency in interpreting or responding to the messages conveyed. Over time, this linear model has been gradually replaced by more circular approaches, grounded in participatory strategies and feedback loops.

Leiss (1996) describes risk communication as a continuous flow of information between experts, academics, political and administrative regulators, interest groups, and the public. However, significant disagreements can arise among these actors, often due to various factors, including differences in approaches and principles, disparities in the information available to each group, and difficulties understanding others’ perspectives. Moreover, the risk communication process can become a source of conflict and controversy. Some obstacles to effective communication include media bias, distortions in source selection, hidden or strategically driven agendas, the amplification of viewpoints perceived as irrational, and difficulties on the part of responsible institutions in adopting language that is accessible and comprehensible to the public. These factors can undermine the ability of risk communication to be truly inclusive and effective.

Despite these persistent challenges – sometimes exacerbated by the disorder of contemporary information systems – theoretical reflection has developed evolutionary approaches to risk communication. A significant example is the phase-based model proposed by Leiss as early as 1996. This framework identifies different stages based on the scientific community's evolving understanding of how to make risk communication engaging for the public.

1. *The Expertise Phase.* In this initial phase, risk communication is characterized by a one-way approach, assuming that scientists, by virtue of their authority and expertise, can legitimize risk communication simply through the rigor of the scientific method.
2. *The Persuasion Phase.* As the field evolves, there is a growing awareness that merely providing information with a “scientific touch” is not enough; it is also necessary to convince the public of the reliability and relevance of the information conveyed. In this phase, persuasive techniques – often borrowed from marketing – are employed to enhance the effectiveness of communication. Institutions must demonstrate their technical expertise and tailor their messaging to the characteristics of different audiences, fostering greater understanding and awareness of risks.
3. *The Trust Phase.* The final phase shifts the focus to the social context and the relationships among the various stakeholders involved in risk management. Persuasive strategies alone are no longer sufficient; building a shared consensus through dialogue with stakeholders and maintaining transparency in decision-making becomes crucial. Governments and institutions must actively engage in risk literacy and prepare the population for potential crises. For risk communication to be effective, it must be structured, coordinated, and oriented toward the active participation of all involved actors.

Determining whether changes in practice stem from shifts in theoretical frameworks remains complex; nonetheless, the relationship between the two appears increasingly interdependent. The evolution of risk communication is closely linked to broader transformations in the conceptualization of risk itself (Balog-Way, McComas, & Besley, 2020). Scholarly literature has articulated multiple definitions of risk, frequently emphasizing its probabilistic nature, wherein events of varying likelihood and impact may occur. As noted by Palenchar and Heath (2007), both deliberate actions, such as prevention and education strategies, and situational factors – whether carefully managed or accidental – can serve to amplify or mitigate perceived risk. Science, along with the communicative processes through which it is conveyed, plays a critical role in shaping these dynamics. In the absence of proactive and coordinated communication by institutional and scientific actors, media narratives and public discourse may influence policy debates, thereby redefining the perceived scope and urgency of risks.

Consequently, trust in the institutions responsible for managing risks, as well as their perceived credibility, may be undermined. These issues align with constructivist perspectives on risk, particularly those concerned with the social amplification of risk. Such approaches underscore the centrality of communication, to the extent that some scholars advocate for its integration into risk assessment processes and policy design (Gabrill & Simmons, 1998; Árvai, 2014). Traditionally, research in risk communication has relied heavily on case studies and the identification of best practices (Sheppard, Janoske, & Liu, 2012). However, more recent developments reflect a growing emphasis on conflict resolution, public engagement, and the establishment of bidirectional communication channels (Aakko, 2004).

Against this backdrop, the following analysis turns to media and communication studies, understood as a composite repertoire of theoretical frameworks, research methodologies, and cognitive challenges. Our point of departure is an examination of the practical tools used in risk communication. The next section outlines the rationale for this investigation and presents the research questions that guide our study.

3. Research questions and methods

The reflections presented in this paper are grounded in the analysis conducted through a scoping review. This methodological approach is particularly effective for exploring the breadth of existing literature on a given topic, enabling researchers to assess the volume and distribution of studies and to identify key thematic areas. Scoping reviews are especially useful in the preliminary phases of research, where the goal is to gather foundational knowledge prior to developing more focused research questions, such as those guiding systematic reviews or meta-analyses. Unlike these more rigid methodologies, scoping reviews offer greater flexibility in terms of inclusion criteria and analytical scope (Munn et al., 2018; Tricco et al., 2016; Pham et al., 2014; Peterson et al., 2017).

This method was selected for its capacity to reduce selection bias through the systematic identification and analysis of literature via database searches. As outlined by Anderson et al. (2008), scoping reviews serve multiple functions, including mapping relevant literature, identifying key concepts, informing policy debates, and supporting stakeholder engagement.

The review represented a central component of our research project and significantly informed the development of the associated communication campaign. Accordingly, our analysis focused primarily on risk communication tools, with particular attention to their application contexts, intended audiences, and media strategies. In parallel, we aimed to critically examine the theoretical underpinnings that support the practical implementation of risk communication. However, the literature reviewed revealed that theoretical discussions were often fragmented and inconsistently integrated. Nonetheless, even these dispersed insights offered a valuable foundation for a broader conceptual reflection on risk communication from the perspective of media and communication studies. To further explore this topic, we will address two key research questions:

RQ1: What insights from media and communication research emerge from the review?

RQ2: What conceptual tools enhance research on risk communication?

To answer the first question, we will analyze how risk communication is defined in the reviewed papers to clarify the scope of the field and its practical applications. For the second question, we will identify the main research frameworks discussed in the literature and examine how they are applied in risk communication.

4. Some insights on the scoping review

4.1 Keywords and search string

We identified keywords to retrieve articles on risk communication and its key components. These were developed through a brainstorming process that combined theoretical concepts with empirical indicators, integrating both inductive and deductive approaches. This process led to the creation of a search string structured around three thematic areas.

The first area focuses on natural and environmental hazards, based on key literature providing an overview of such risks. The second targets risk communication, with keywords selected to capture studies relevant to the communicative dimension. The third area includes terms related to communication campaigns and practices, partly inspired by McGuire's input-output model for persuasive message design (2013).

The search string was executed across primary databases, including Scopus, Web of Science, EBSCO, ACM, and IEEE Xplore. No filters were applied to selecting articles, except for language (English) and publication format. In total, 1387 papers are included in the final dataset. Articles have been retrieved in June 2023.

As the database was being organized, specific inclusion and exclusion criteria were defined to guide the screening of abstracts and the subsequent selection of articles for in-depth analysis. Due to the substantial volume of articles, we focused on the concept of *intentionality*, considering the academic definition of a "communication campaign" as theoretical insight.

Hence, the selected elements conformed to the abovementioned criteria, implying a certain degree of intent in production and/or direction. The following were encompassed: a) communication campaigns with clearly identifiable promoters and goals; b) case studies detailing strategies, actions, and approaches of specific institutions; c) tools employed in communication and risk awareness (e.g., visual graphics, specific formats, using of social networking sites for information dissemination, communication tools involving participatory projects, etc.).

The initial dataset was analyzed in consideration of the specified criteria. A researcher from the team read the abstracts of all collected articles (N = 1387) to evaluate whether they were suitable for the subsequent phase, which involved reading the full texts. The guiding principle was the identification of specific campaigns, tools, and case studies.

Following this review, 200 articles were identified for full-text reading. Then, after retrieving the papers and reading the complete text, 75 articles were eliminated. The final pool of documents comprises 125 papers that have been thoroughly read and analyzed. In the following paragraph, we summarize the main results.

4.2 Literature characteristics

The 125 selected papers were published between 2006 and 2023¹. Of the 125 articles analyzed, 110 adopt a single-risk approach, focusing on a specific risk, while 15 explore multi-risk scenarios. Flooding and hydrogeological risks are the most frequently discussed topics.

Out of the 125 papers reviewed, 120 specify the geographic context in which the risk communication tool or action is implemented. Considering the geographical distribution of papers, it can be observed that the results confirm a tendency toward an American focus on risk communication. This distribution demonstrates that, even though current risks may have global implications, each geographical context faces specific and unique risks compared to the region in which it is situated, and attention to risk communication remains uneven.

The final set of reviewed papers is categorized into three macro-thematic areas identified in the literature: (1) 73 papers focusing on risk communication tools, (2) 45 papers addressing risk communication experiences in specific contexts, and (3) 7 papers summarizing risk communication campaigns. This distribution suggests that the research predominantly emphasizes either micro aspects, such as specific or targeted tools, or broader dimensions, as evidenced by the substantial number of risk communication experiences illustrating the connection between ongoing communication efforts and specific social or applied contexts.

5. Risk communication definitions

To verify whether there was a critical reflection on the delimitation of the study's object, we examined the presence of explicit definitions of risk communication.

Only 18 papers clearly state what risk communication is. To avoid misinterpreting the authors' directions, we included only the definitions of risk communication when explicitly expressed. So, only clear definitions of risk communication were included (e.g., when introduced by phrases such as "Risk communication is...").

We may suppose that such underrepresentation of basic definitions of risk communication is because most of the papers in our study are published in highly-specialistic journals, with natural and environmental risks as the main topic. Therefore, a scholarly definition of risk communication would probably be deemed unnecessary, as it may be considered common knowledge among reading communities. References are listed in *Appendix A*.

Although limited in number, the definitions of risk communication identified in the literature help delineate both the core concept and the communication models underpinning its practice. Most definitions incorporate key elements common across various theoretical frameworks: the source, message characteristics, objectives, communication flows, and audiences. This structure closely aligns with classical models, such as Lasswell's (1948) formulation, which analyzes

¹ The results of these review are discussed extensively in Massa & Comunello (2024).

communication by addressing five key questions: “Who says what, through which channel, to whom, and with what effect?” Each component offers a lens for examining specific aspects of the communication process. This model also reflects the mass communication paradigm, as many tools and practices examined are designed for broad, general audiences and rely on integrated media strategies aimed at maximizing public reach.

Some aspects help clarify the underlying vision of risk communication. Indeed, the question regarding who communicates is most often answered by specifying the role and nature of the communicators. These can be considered “mediators” (Bica et al., 2020), “academic experts, regulatory practitioners, interest groups” (Link & Stotter, 2020), “experts” (Herovic et al., 2020); “risk managers” (Matti et al., 2022) or generic stakeholders (Agrawal et al., 2020; Badri et al., 2020).

However, the recipients of these communication processes are seldom detailed: they are primarily generic stakeholders, broadly understood audiences, and the characteristics of the receivers are not specified. The more technical aspects of risk communication (such as media and how communication occurs) remain largely implicit. Nevertheless, there is a notable frequency of references to dialogical and bidirectional processes, implying transmission models of communication, based on the exchange of information. Summarizing all the definitions, we may state that:

Risk communication is an interactive and dialogical process expected to involve general audiences. Experts, practitioners, and significant stakeholders are the primary sources of risk communication. Risk communication must be informative, meaningful, systematic, and grounded in a scientific method and the principle of parsimony. It may include significant information about the probabilities and potential outcomes of an event that may or may not occur. To be effective, it may use graphical and visual tools. Risk communication aims to exchange information in a high-concern environment. It may explain potential threats, share warning messages, and make post-event recommendations. Risk communication relies on the audiences’ feedback because it may build repertoires of experiences, interpretations, and concerns about risks.

6. Theoretical Frameworks

To better understand how research tools specific to media and communication studies, viewed from a sociological perspective, can contribute to advances in risk communication, we have reviewed the theoretical frameworks adopted in the selected papers. The resulting list highlights potential applications for enhancing our understanding of risk communication.

The guiding principle behind the identification and synthesis of theoretical frameworks was the link between insights from theory and the tools or actions outlined in the papers. As a

methodological safeguard against overinterpreting theoretical frameworks or arbitrarily attributing meanings disconnected from the empirical focus of the papers, we included only those frameworks explicitly linked to the case studies under analysis. More precisely, we excluded frameworks when (a) they were not clearly relevant for interpreting the empirical research presented, or (b) they consisted merely of generic summaries of risk communication attitudes. The theoretical frameworks retained predominantly originate from sociological research. When frameworks from other disciplinary domains were included, it was because they offered meaningful insights into the social dimensions of communication processes, thereby aligning with the overall analytical perspective of the review. This process identified 52 papers containing at least one explicit theoretical framework.

The *risk society* perspective has been explored in three papers. Beck (1986) argues that modern risks are reflexive and self-induced, emerging as unintended consequences of human activities. In the era of high modernity, risks primarily stem from technological advancements, including nuclear power, pollution, and land grabbing. In this context, science and technology play a dual role: they contribute to generating risks while simultaneously being relied upon to diagnose and mitigate them. Although communication is not explicitly central to this perspective, it remains essential for understanding media representations of risk. Notably, this approach highlights the pervasive uncertainty surrounding risks and recognizes conflict as an inherent element in their negotiation and interpretation.

Canonical approaches underlining the sociological roots of risk communication research can be found in the *social amplification of risks (SAR) frameworks or constructivism*. Eight papers analyze risks using the SAR framework or a social constructivist perspective. SAR suggests that risks are shaped not only by actual hazards but also by social and cultural processes. According to Kaspersen et al. (1988), information processes, institutional structures, social behaviors, and individual responses contribute to the social risk experience, influencing risk consequences. Risk is socially constructed and influenced by expert definitions, social perceptions, and processes.

Approaches to *risk knowledge and information presentation* include cognitive heuristics, mental models (n = 6), and framing (n = 5). Heuristics help individuals process complex information by simplifying it into accessible judgments, contributing to the formation of mental models – internal representations of reality shaped by personal experience, external knowledge, and contextual data. These models, in turn, guide how individuals interpret and respond to risk.

Framing introduces a sociocultural dimension, situating risk perception within psychological, organizational, and political contexts. As Entman (1993) argues, framing selects and emphasizes certain aspects of reality, influencing how problems are defined and addressed. By portraying an issue as urgent or threatening, communicators can shape public responses, institutional trust, and behavioral outcomes.

These mechanisms carry significant implications for risk communication. Heuristics and mental models affect how messages are interpreted, underscoring the need for strategies aligned with audience perceptions. Framing, meanwhile, steers public discourse by legitimizing certain risks over others and shaping competing narratives. Far from being neutral, framing is inherently

political: it determines visibility, priority, and credibility in public debate. Understanding these cognitive and discursive processes is essential in a context where communication shapes risk governance and collective decision-making.

Media and communication perspectives are characterized by a fragmented set of frameworks, including communication theories (N = 5), communication models (N = 8), and digital media theories (N = 2). Communication theories address the complexity of media systems through which risk-related information is produced and perceived. For example, the mediatization approach (Couldry & Hepp, 2013) emphasizes the media's central role in mediating everyday social interactions, including risk perception. Media Ecology (Broad et al., 2013) considers the media environment as a whole, stressing how the ecosystem influences risk communication. Other frameworks, such as Norman's *The Design of Everyday Things* (2013), focus on how the design of media interfaces shapes information accessibility and usability, thereby affecting public understanding of risk. Similarly, Actor-Network Theory (Latour, 2007) explores how human and non-human actors – such as technologies and media – interact to shape the circulation and interpretation of risk information.

Communication models help explain how information circulates and how audiences engage with it. While some studies adopt one-way models to describe the top-down dissemination of official information during emergencies, most favor two-way models that incorporate audience feedback as a key component. Hall's encoding/decoding model (1980), cited by de Leon (2021), highlights the gap between institutional message production and audience interpretation, shaped by power and cultural dynamics. Similarly, VanDyke et al. (2021) draw on Katz and Lazarsfeld's (1954) two-step flow model to emphasize the role of interpersonal mediation in spreading information.

Digital media theories – such as digital positivism (Fuchs & Mosco, 2016) and networked publics (boyd, 2010) – provide critical insights into how digital affordances influence risk communication, particularly through the shaping of networked relationships and the circulation of information on social platforms.

Several papers (N=5) are based on well-established *models for understanding risk and its communication*¹. The Protective Action Decision Model (PADM) integrates environmental and social cues with information transmitted through communication channels to guide the public's processing of risk-related information. Another model, the information-deficit model (Stephens & Richards, 2020), posits that citizens are often unaware of risks due to a lack of scientific knowledge, and therefore, experts must communicate critical information to the public through mass media in a linear manner.

Six papers focus on *public relations and organizational communication theories*, which examine how organizations engage with the public during crises and risks. Organizational communication encompasses internal and external communication, including interactions between organizations and their stakeholders. Public relations techniques are frequently employed to strategically

¹ While the dimension of risk perception was excluded from the review for the sake of consistency, these approaches were recorded when deemed relevant by the authors to understanding the instruments or describing the research findings.

enhance trust and foster meaningful relationships with the public during crisis events. For instance, Coombs's (2007) Situational Crisis Communication Theory (SCCT) evaluates an organization's ability to manage communication effectively during crises.

Five papers apply *social movement and collective action theories* to explain how individuals engage in coordinated efforts to address risks. Benford and Snow (2000) argue that framing is crucial in mobilizing individuals for collective action, particularly in resource mobilization and persuading people to address risks. These framing processes help define situations that require public attention and encourage participation in problem-solving efforts.

Finally, five papers present specific or *ad hoc theories* tailored to risk communication contexts. For example, Holmes and McEwen (2020) employ the Sustainable Flood Memory (SFM) theory to investigate how memories of past floods affect citizens' reactions and preparedness in high-risk situations. Similarly, Rainear et al. (2018) utilize uncertainty reduction theory to enhance risk communication strategies.

7. Discussion and Conclusion

This literature review, based on an in-depth analysis of 125 papers, highlights the value of a sociological approach to studying applied risk communication. We focused on practical tools, as they offer a lens through which to explore the link between theoretical frameworks and communication practices.

The analysis centers on the U.S. context, where much of the research on operational tools is concentrated. This focus does not suggest that other experiences are marginal but rather invites reflection on their visibility in international journals. Such journals may unintentionally privilege English-speaking contexts and overlook cases perceived as too context-specific, thereby limiting the diffusion of less generalizable but nonetheless significant practices.

Another relevant aspect concerns the alignment between the practical tools described and the more theory-oriented insights emerging from the literature. A central theme in risk communication is the need to reach the widest possible audience by tailoring messages to individuals with specific needs and characteristics (e.g., people with physical or cognitive disabilities, older adults, children, adolescents ...). Equally important is the promotion of two-way communication, which entails not only receiving feedback but also integrating it into more structured co-participation strategies. While the limited definitions of risk communication generally acknowledge this latter dimension, the practical applications reviewed seldom reflect it, and the theoretical frameworks discussed often fall short of capturing its full complexity.

Many aspects emerge as worthy of further exploration, inspired by the principles of communication research. For example, the tendency to describe generic tools aimed at undifferentiated audiences leads to the need to reflect on the potential for personalization and the ability to reach specific audience niches more effectively. At the same time, the analyzed papers

highlighted the role of institutions and public-sector actors in producing content and disseminating risk communication messages (and not just during crises). Closely related to this point is the recognition that social media and social network sites are now frequently used by public actors for risk communication. However, few studies emphasize the organizational dimension, understanding how these institutions function, what bureaucratic and organizational resistances they face, or how red tape impacts the cultures of organizations. These aspects – often raised by professionals responsible for crisis and emergency communication (Lovari et al., 2024) – still find limited space in the literature. Yet, understanding their limits and potential would be crucial for designing tools that institutions can apply.

A series of theoretical and practical tools can help refine our understanding of contemporary risk communication. For instance, focusing once again on reception, knowledge would certainly be enriched by applying qualitative theoretical frameworks (and corresponding empirical applications). One can imagine, for example, the contribution that audiences and reception studies could provide in understanding risk communication messages. What happens when a message is received, how much does the context of consumption and the relational network with which the experience is shared matter, and in what way does “domestic security” mediate and interact with messages (even skillfully) sent by institutions remain points to be clarified, possibly through participant observation or ethnographic tools. Further on the processes of reception and interpretation, a complex environment like the contemporary one could benefit from revisiting a perspective such as encoding/decoding. Perspectives like this recognize the existence of power—and therefore knowledge—differentials and the importance of the situated nature of both sources and recipients, emphasizing the complex mix of personal and contextual factors that interfere with the interpretation desired by the risk communication transmitters.

Moreover, in a hybrid media environment like the contemporary one, issues concerning agenda setting, particularly inter-media agenda setting, resurface strongly. Topics such as the risks related to climate change are increasingly tied to their representation through mainstream media and the knowledge or actions of users through digital media. Agenda setting, framing, and priming are necessary to understand the role of the media in risk communication, from how they help trigger attention around specific topics to how the framing of these topics helps define some issues as riskier (or at least more urgent and impactful) than others, and how audiences use risk management and identification as a measure for civic and political judgment.

Then, many aspects could be discussed and explored in depth so that the tools of communication sociology can better help us understand the complexity of risk communication. To provide a few examples, one can consider themes (not only concerning natural risks but also well-suited for exploration regarding health or anthropogenic risks) closely related to how information is produced and disseminated in the crowded media and communication landscape. Among other things, it would be worthwhile to explore certain issues related to complexity. Among these issues, we can count the relationship between sources, power, production, and reception, the communication and understanding of uncertainty factors, the popularization of scientific knowledge and risk communication, and the link between skepticism and media coverage.

In conclusion, we are faced with an ambivalence. On the one hand, risk communication is already a specialized field of inquiry, with its authors and reference literature, consolidated investigative methods, rhetoric, and “writing styles.” On the other hand, there is a suspicion that media and communication research currently play a limited role despite its high heuristic capacities.

Risk communication is a field with significant multidisciplinary potential. Communication studies have proven capable of engaging with other disciplines, while at the same time, fields such as psychology increasingly claim spaces traditionally associated with communication. For instance, the selection criteria presented in this paper were primarily designed to identify applied experiences and tools in risk communication, with the aim of building an archive to support the project’s future goals. This choice also reflects an awareness that key communication-related topics, such as public perceptions and the relationship with information sources, are often examined in the literature using methodologies rooted in other disciplines. It is also worth remembering the necessity of dialogue with other sociological disciplines: the sociology of territory, urban studies, and political sociology are just a few tools that can enrich our understanding of risks and their communication in tumultuous times.

In sum, an in-depth review of literature on risk communication tools reveals a somewhat paradoxical picture. Despite focusing on communication, many analyses of applied experiences seem to resist what British sociologist Nick Couldry (2012) calls the “myth of the mediated centre” – the belief that all social processes necessarily pass through media systems. As a result, communication media are often treated instrumentally, with limited attention to their constitutive role in shaping social reality.

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Appendix A. Risk communication definitions

<i>Authors</i>	<i>Source</i>	<i>Aims</i>	<i>Flow</i>	<i>Audience</i>
Agrawal; Hana; Debadutta; Neelakshi (2022)	Stakeholders	Exchange of information regarding environmental risks	Exchange	Unspecified
Badri; Lubis; Susanto; Suharjito (2018)	Stakeholders	Exchange of assessments, forecasts, and opinions on hazards and risks	Exchange	Unspecified
Bica; Weinber; Palen (2020)	Unspecified	Describe risks	Interaction	Unspecified

Bird; Gísladóttir (2020)	Unspecified	Disaster warning and hazard education	Unspecified	General audience
Charrière.; Junier; Bogaard; Mostert; Malet; van de Giesen (2017)	Unspecified	Favors the expansion of social capacities, such as the knowledge, skills, and networks needed to successfully manage hazard occurrences	Dialogical	Unspecified
Cool; Claravall; Hall; Taketani; Zepeda; Gehner; Lawe-Davies (2015)	Unspecified	To cope with crisis or emergency management	Unspecified	Unspecified
Heidenreich; Masson; Bamberg (2020)	Unspecified	Exchange of information	Feedback loop	Unspecified
Herovic; Sellnow; Sellnow (2020)	Experts	Searching for potential threats, preparing the audiences via warning messages and post-event recommendations	Dialogical	Various Publics
Hicks; Armijos; Barclay; Stone; Robertson; Cortés (2017)	Unspecified	Prevent and mitigate harm from hazards by informing and empowering people	Unspecified	Unspecified
Jiang; Zhang; Guo; Cheng; Peng (2022)	Unspecified	Communicate effectively in a high-concern, high-stress environment	Unspecified	Unspecified
Kinsky; Chen; Drumheller (2021)	Unspecified	Identify the potential for crisis	Unspecified	Unspecified
Link; Stötter (2015)	Academic experts, regulatory practitioners, interest groups	Exchange knowledge, experiences, interpretations, concerns, and perspectives	Interaction; feedback	General audience
Matti; Ögmundardóttir; Aðalgeirsdóttir; Reichardt (2022)	Risk managers	Notify people of the probability of a hazard and its consequences, mitigation actions, raise and understand concerns	Interactive flows; two-way dialogue	Unspecified
Rowel; Sheikhattari; Barber; Evans-Holland (2012)	Unspecified	Inform decision-making and reduce uncertainty	Iterative process, feedback	Unspecified

Salvati; Pernice; Bianchi; Marchesini; Fiorucci; Guzzetti (2016)	Unspecified	Exchange information of	Two-way exchange	Unspecified
Shepherd; van Vuuren (2014)	Unspecified	Allow people to make better decisions about their well-being	Unspecified	Individuals, stakeholders, or an entire community
Shrestha; Gurung; Khadgi; Wagle; Banarjee; Sherchan; Parajuli; Mishra (2021)	Stakeholders	Communication and exchange of information and opinion about risks	Two-way communication, interactive process	Individuals, groups, and institutions
Yudarwati.; Putranto; Delmo (2022)	Unspecified	Reduce or prevent damages, ensure assistance, rebuild infrastructures	Unspecified	Victims

Vulnerable Publics in the 2023 Türkiye Earthquake Disaster: A Study on Communication-Centred Experiences of Persons with Disabilities

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Abstract. On 6 February 2023, two major earthquakes occurred in Türkiye, impacting eleven provinces and resulting in a death toll exceeding 50,000. This study explores the communication-related experiences of persons with disabilities and their families in the aftermath of the earthquakes, focusing on the Antakya region of Hatay. The research findings, derived from semi-structured interviews with caregivers, contributions from NGOs, and insights from health professionals, underscore the communication gaps concerning disaster preparedness for this vulnerable publics. The research indicates a lack of accessible risk information, personal disaster plans and participation in disaster preparedness. The study provides recommendations for future disaster risk communication efforts, with a focus on meeting the communication needs of persons with disabilities.

Keywords: Earthquake, disaster risk reduction, risk communication, persons with disabilities, vulnerability

1. Introduction

On 6 February 2023, two earthquakes of Mw: 7.7 and Mw: 7.6 with epicentres in Pazarcık (Kahramanmaraş) and Elbistan (Kahramanmaraş) occurred at 04:17 and 13:24 respectively in Türkiye (AFAD, 2023). The earthquakes had an impact on eleven provinces, including Adana, Adıyaman, Diyarbakır, Elazığ, Gaziantep, Hatay, Kahramanmaraş, Kilis, Malatya, Osmaniye and Şanlıurfa. According to official figures, the total number in the death toll was 50,783 and the number of injured was 115,353 (AFAD, 2023: ii). The earthquakes that hit Türkiye and Syria resulted in one of the most devastating disasters to impact the region in recent times. The objective

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of this study is to provide insight into the communication-based experiences of persons with disabilities in the earthquake that occurred in Türkiye on February 6, 2023.

2. Literature Review

The exact number of persons with disabilities and their families directly and indirectly affected by these earthquakes is not known. According to United Nations Convention on the Rights of Persons with Disabilities, "persons with disabilities include those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others" (CRPD, 2006). Despite the absence of precise data, it is evident that the population with disabilities affected by earthquakes is substantial, given the diverse types of impairments.

Disasters affect persons with disabilities disproportionately, having a greater impact on vulnerable groups. According to United Nations Office for Disaster Risk Reduction, vulnerability is defined as "the conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards" (UNDRR, 2017). In emergencies and disasters, persons with disabilities have the same rights and needs as any other citizen but face additional barriers and risks that require specialized responses (ECFF, 2024: 8). A substantial body of research has indicated that persons with disabilities are disproportionately susceptible to elevated risks of mortality, injury and medical complications in the event of disasters or emergencies. This heightened vulnerability is further compounded by the challenges these individuals face in accessing assistance from search and rescue teams or volunteers, which can result in prolonged recovery periods (ISMAP, 2023: 13). It is therefore critical for societies to be aware of the difficulties encountered by persons with disabilities during disaster and emergency situations. In turn, this awareness should be reflected in the preparedness plans for such situations (Kurt, 2019).

3. Methodology

The study explores the communication-related experiences of the persons with disabilities and their families in the 6 February 2023 earthquake disaster in Türkiye. This study, which is the initial output of a larger project, consists of ten semi-structured interviews with families, living in Hatay in Antakya region, of persons with mental, sensory and physical impairments who are completely dependent on their families for care and were most affected by the 2023 earthquake. Ethical approval of this study was obtained from Ankara University Ethics Committee¹. The participants in the study were predominantly mothers from low socio-economic groups, aged between 31 and 64, who were responsible for the care of persons with disabilities. Additional information was gathered from two non-governmental organizations (NGOs) that were working with these vulnerable publics and two frontline health specialists. During the interviews, the following questions were addressed: (1) Did these persons with disabilities and their families have any personal preparedness for disasters such as earthquakes? (2) What challenges have they encountered in accessing information regarding risks and measures in earthquake disaster?

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4. Findings and the Implications for Future Disaster Risk Communication Efforts

The Sendai Framework for Disaster Risk Reduction 2015-2030 has added a focus on people with disabilities in disaster risk reduction efforts. In addition, the UN Sustainable Development Goals have also provided a basis for dealing with the issue (UN Department of Economic and Social Affairs, 2024). Therefore, disaster risk communication studies for persons with disabilities have been shaped by international practice and literature on the subject, together with works structured according to the Sendai Framework. Türkiye has also taken steps in this regard. Nevertheless, in this study, through in-person interviews, it is identified that persons with disabilities and their families possess limited risk information concerning disasters such as earthquakes and, consequently, they are not familiar with the preparedness plans in the event of such an emergency. In this respect, our findings are consistent with the international literature. According to the UNDRR 2023 Global Survey on Persons with Disabilities and Disasters, globally 84 per cent of persons with disabilities reported not having a personal disaster preparedness plan and 56 per cent reported not being aware of or having access to disaster risk information in accessible formats in their communities (UNDRR 2023:10).

NGOs dedicated to supporting persons with disabilities have made notable contributions, especially in organizing communication efforts regarding the needs of the affected population. These contributions have played an important role in facilitating the recovery process. By forming a network of disability NGOs, they have assisted the identification of needs and facilitated the delivery of aid. Despite their active roles in the aftermath of disasters, NGOs' involvement in activities related to disaster risk prevention has been limited and it is evident that this involvement should be strengthened. Several researchers emphasize the importance of including people with disabilities and civil society organizations (CSO) in all stages of the disaster management cycle and disaster risk reduction efforts (Shaw and Izumi, 2014).

In the light of the interviews, the following recommendations are suggested:

1- Persons with disabilities, together with their caregivers, should be considered as active components of the disaster risk communication process.

2- Disaster awareness and preparedness activities should be inclusive, taking into account different types of disability. To this end, accessibility of risk information should be ensured. For example, "easy-to-read" methods and "alternative communication languages", which were not common in the education of people with special needs in Turkish, should be explored.

3- In order to assist personal disaster plans for persons with disabilities and their caregivers, trainings and contents should be prepared, disseminated and made accessible. This information should cover earthquake kits, initial precautions for people with disabilities and special evacuation plans.

4- Persons with disabilities and their caregivers should be informed of the contact details of the authorized organizations they should call in the event of a disaster and how to reach these

organizations. This can be done through a dedicated communication line, a virtual application, etc. These communication channels should be multilingual and should be accessible for different disability needs. Establishing a participatory, inclusive and symbiotic disaster risk communication plan in a wide spectrum is crucial (from mukhtars to local governorships, public institutions and organizations, special education institutions and rehabilitation centres).

5- Developments in new communication technologies have great potential for disaster risk communication with persons with disabilities. Artificial intelligence technologies and digital tools can be integrated into the communication process. The accessibility of these digital applications for different types of disabilities should be considered.

6- In countries such as Türkiye, where the care of people with disabilities is mainly provided at home and by mothers, the socio-economic characteristics of women should be taken into account when developing the risk information content. Factors such as women's low access to basic education and/or limited experience of participation in social life increase the communication barriers faced by the families of persons with disabilities. When designing disaster risk communication activities, measures should be taken to address the communication barriers. For example, training in disaster management, disaster communication and disaster/risk planning can be included in open secondary school programmes.

7-Educational institutions and rehabilitation centres where persons with disabilities are educated should be considered as an important tool for the disaster risk training of caregivers. In addition, Whatsapp/Telegram/Facebook groups created by mothers or caregivers and specialized teachers may facilitate cooperation during the disaster.

8- Staff and institutions providing education to persons with disabilities should be involved in the disaster risk reduction communication process. Disaster risk communication training with teachers in these educational institutions can be regularly renewed and people's knowledge on the subject can be kept alive.

9- A specialized group of staff with expertise in disability inclusive emergency management, involved in search and rescue, intervention and rehabilitation processes, should be organized and trained in the communication needs of these populations.

10- Disaster risk communication activities within disaster risk reduction programmes should take into account the unique structure and characteristics of different regions and, in this context, tailor risk information communication materials. In order to achieve this inclusiveness and integration, it is important to involve experts and competent people who have a good knowledge of the region in disaster risk reduction activities.

11- NGOs and organizations of people with disabilities should be included in the process as one of the key stakeholders and active participants in the disaster management cycle so that their needs can be included in all plans, programmes, protocols, preparations and implementations of disaster risk reduction while the inclusiveness of activities should be strengthened.

5. Conclusion

As a conclusion, it is imperative to establish effective communication channels and mechanisms among persons with disabilities, their families, healthcare professionals providing care for them, public authorities, healthcare services and non-governmental organizations. This is essential to foster dialogue, interaction, and cooperation in disaster risk reduction and risk communication efforts. Furthermore, it is crucial to encourage the development of inclusiveness, accessibility, and participation of these mechanisms.

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Educated Youngsters’ Risk Perception and Seismic Preparedness – Lessons for Crisis Communication in the Case of Earthquake-prone Greece

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Abstract. Responding effectively to a destructive seismic event remains an important challenge and preparedness is considered a key element. Risk perception has been well documented to predict the willingness to adopt and carry out preparedness measures. This research focuses on seismic risk perception, in particular if and how it motivates protection behaviors and preparedness actions of youngsters and especially students of the Universities in Greece. The communication preferences of this population group during a seismic crisis as well as the level of the students’ trust towards competent authorities are also investigated. An online survey has been conducted targeting the students of the Universities in Greece using social media and email communication channels/ 601 answers have been collected. The results show that (a) although participants have good knowledge on protective measures during a seismic crisis, preparedness protective actions have been undertaken by only a small portion; (b) the dominant factors motivating preparedness responses are personal psychology factors, level of worry and previous experience of a strong seismic event; (c) women are featured by higher risk perception which however does not translate into undertaking more preparedness actions (d) participants are by priority concerned with forest fires, they are less and equally worried about heat waves, earthquakes, and pandemics; (e) participants put their trust more in scientists and emergency operators (than in Governmental authorities –central and local) for guiding information during a seismic crisis, and (f) internet sources (social media and news websites) are the most popular means for receiving and sending information, (g) there is evident tendency to focus on reacting and responding rather than preventing against earthquakes and earthquake disasters.

Key words: Seismic risk perception, preparedness, self-protection measures, crisis communication.

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1. Introduction

Europe has a long history of damaging earthquakes, even though the world's deadliest seismic events occur in other regions, mainly in Indonesia, China, Japan and Chile (USGS 2002). The highest seismicity rate in Europe is concentrated in the southern part, particularly Italy, Greece, Albania and Romania. According to the Emergency Event Database (EM-DAT), between 2010 and 2023, earthquakes have been the second, mostly affecting natural-related disaster in Southern Europe.

In the aftermath of destructive earthquakes, apart from judgments on the efficacy of the countries' response mechanisms, concerns about the levels of preparedness of the victimized communities are raised. Enhancing preparedness to effective responding is among the four priority targets of the Sendai Framework for Disaster Risk Reduction 2015-2030 (UNISDR, 2015). The objective of the present research is to investigate the multi-dimensional concept of preparedness and response behavior of individuals in anticipation of and during an earthquake disaster in Greece. The focus is on young adults between 18-40, exploring youth's perception regarding seismic risk and highlighting the respective components (worry, trust, experience, knowledge) that motivate/impede protection behaviors and disaster preparedness. The youngsters are, after all, acknowledged as *agents of change* by the people-centered preventive approach to disaster risk of UNISDR, 2015 and *should be given the space and modalities to contribute to disaster risk reduction, in accordance with legislation, national practice and educational curricula*" (UNISDR, 2015, p. 23).

2. Theoretical background

Preparation behaviors towards a risk -also referred to as (*seismic*) *adjustment behaviors* (Solberg et al. 2010) or *attitudes* towards risk (Toma-Danila et al., 2021)- as well as response behaviors, result from the way the risk is subjectively perceived (Plapp and Werner 2006; Cisternas et al 2023; Shapira et al., 2018; Kung and Chen 2011). According to Paek & Hove, 2017 and Slovic & Peters, 2006 there are two dimensions of risk perception: the cognitive and the emotional dimension. The cognitive dimension links people's protective behaviors and reactions to their level of knowledge, and understanding of risks (Slovic & Peters, 2006). According to the Information Deficit Model-IDM (Miller 1983) public's perception, beliefs and attitudes may be (re)formulated when the public receive relevant information, thus highlighting the close relationship between knowledge and behaviors. In fact, in the absence of a previous experience, disaster knowledge and awareness may fill the gap in adopting mitigation/preparedness measures and provide/ improve skills to respond properly (Ao et al 2021; Tekeli-Yeşil et al., 2010). IDM has been criticized to overpass critical factors including psychological drivers (Ecker et al 2022). According to the scholars focusing on the emotional dimension, peoples' protective behaviors and reactions are driven by emotions such as worry or fear (Slovic et al., 2002). The results of numerous studies on the effect of worry on disaster preparedness are not always consistent; Takao et al., 2004; Rüstemli and Karanci, 1999 argue that worry affects positively disaster preparedness, while Lindell and

Whitney, 2000; Siegrist and Gutscher, 2006 find no correlation at all. Moreover, academic literature in natural disasters associates emotions with past experience (Plapp & Werner, 2006) . The severity or the frequency of a disaster experience influences the levels of worry and concern with an indirect positive impact to the relationship of experience with preparedness (Siegel et al 2003; Miceli et al 2008). Other studies though do not support the idea that experience necessarily reinforces precautionary behaviors (Lindel and Perrey 2000; Becker et al 2017). In fact, it may lead to overestimation of coping abilities (Wachinger et al. 2013) or a false sense of security (Ruin et al 2007).

The impact of personal characteristics (age, gender, education, income etc.) on risk perception has been investigated also. Men and women perceive risks differently (Gustafsdod 2006): while women are reported to perceive higher risks than men (Barker et al 1997; Funicane et al 2000; Subiza-Pérez et al 2020) and have better knowledge on protective measures, they seem to be less willing to adopt preparedness actions (Cvetković et al 2018; Ekenga et al 2019; Cuesta et al 2022). The role of (formal) education has been often documented by several researchers to improve disaster preparedness especially in terms of increasing the ability to access information (Hoffman and Muttarak 2017, Kirchenabum et al 2017). Geographical variables, such as physical proximity, are also reported to influence disaster/ hazard preparedness behaviors. People living in disaster prone areas show higher levels of preparedness (Baker 2011).

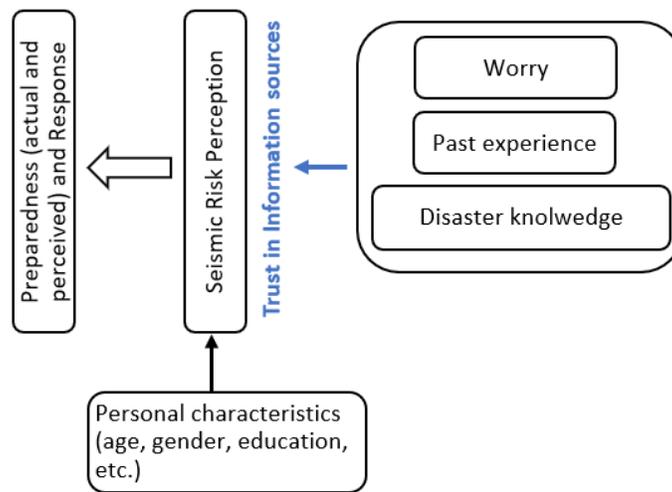


Figure 1. Variables of seismic risk perception and preparedness and relevant impact on preparedness levels mentioned in Section 2. Source: authors' elaboration for the needs of the present research.

As already analyzed, risk perception is considered a keystone for preparedness. An interconnected critical issue is identification of the appropriate communication strategy that fosters preparedness

levels and appropriate behaviors during earthquake emergencies. A consequent query refers to the trustworthy sources and channels accessible by the public in times of earthquake emergency. The Media is the principal link between science and the public and the Media's effect on risk perception, as risk amplifier or attenuator, has been argued for long by researchers (Beck 1992; Kaspersen et al 1988). This effect has received an increased interest in modern studies as well (Kim et al 2020; Tekeli-Yesil et al 2019). Especially the interplay between social media and risk/crisis communication and disaster preparedness has been captured by numerous research studies (Pignone et al 2022; Gulesan et al 2021).

3. Methodology

An online survey has been conducted between May and July 2023 in Greece targeting the students of the Universities in Greece and covering a wide range of scientific disciplines¹. The questionnaire consisted of 29 closed-ended questions and was circulated through email communication channels with the support of the University Faculties' Secretariats. The recipients were undergraduate and post-graduate students. Social media have been also used, mainly by posting the questionnaire to the Universities' official Facebook pages. 601 answers have been collected.

3.1. Participants and data collection

The recipients (undergraduate and post-graduate students in Universities in Greece) were recruited by using the Student Email Lists available by the University Secretariats, as well as the currently available Student Group Accounts on Facebook. Young adults between 18-40 are expected to be already informed (especially from their school environment) about natural hazards and safety measures as well as prevention and preparedness responses. This is an assumption under investigation. Learning process on disasters has to be ongoing and lifelong (Dahl and Millora, 2016) and it is possible and feasible not only through formal communication channels and practices, such as training campaigns by institutes, competent authorities etc.; informal social networks have been acknowledged as an alternative means for information transfer even copying behaviors and attitudes (Kirschenbaum et al 2017). University students are by all means members of a large social network facilitating channels of communication for sharing experiences and knowledge that promote earthquake preparedness (Losee et al 2022).

¹ Raw data were generated in Greek at <https://docs.google.com/forms/d/1WGzSUjPBcMLnjqWyK1J1Yh9HNZgJzdA2RBEtPnwtQQ/edit>
The derived data supporting the findings of this study are available from the corresponding author [A.F.] upon request.

3.2. The questionnaire

In order to reveal participants' perception and attitudes toward seismic risk the questionnaire was organized into four sections: (i) participants' sociodemographic characteristics (Table 1), (ii) knowledge about earthquakes and earthquake disasters (Table 2) and the level of worry (Figure 3), (iii) knowledge on (self) protective measures (Figure 4) and level of preparedness and preparedness intentions (Table 4), and (iv) communication preferences during seismic crisis (Table 5).

4. Results, data analysis and interpretation

4.1. Socio-demographics

The first section of this research summarizes participants' socio-demographic profile (Table 1). The sample consisted of 375 (62.4%) female, 219 (36.4%) male university students and 7 (1.2%) who preferred not to answer. The majority is between the ages of 18-25 (n383, 63.7%) while most answers were collected by students of Natural and Physical Sciences -Technological and Applied Sciences (n281, 49.3%). Seismology/ Geophysics courses, possibly shaping participants' responses, were undertaken only by the 19.3% of them. A portion of 43.9% (n264) of participants lived in houses built in the period 1960-1995, that is after the first anti-seismic building regulation in Greece in 1959 (Greek Code for Seismic Resistant Structures- EAK 2000). Since 2000, the new Greek Anti-Seismic Code has been in force, after several amendments and modification. In 2003, the Seismic Hazard Zone Map of Greece was modified, to include three (instead of four) Seismic Hazard Zones I, II and III (EAK, 2003), (Figure 2). The map illustrates the expected level of ground shaking at specific locations, after a future potential earthquake. (I indicates the weakest earthquake ground motion and III the strongest). The majority of participants reported that they lived in areas of the lowest seismic hazard (Zone I, n372, 61.9%, Table 1).

Table 1. University students' demographic characteristics (n= number of participants)

Variables	n	%
<i>Gender</i>		
Male	219	36.4
Female	375	62.4
N/A	7	1.2
<i>Age</i>		
18-25	383	63.7
26-35	104	17.3

>35	114	19
<i>Branches of science/ Scientific Disciplines</i>		
Human, Social, Law and Political Sciences	114	19
Financial and IT Studies	88	14.6
Educational Studies	18	3
Healthcare and Life Sciences	83	13.8
Natural and Physical Sciences -Technological and Applied Sciences	296	49.3
Other	2	0.3
<i>Academic Title (Status)</i>		
Undergraduate students	400	66.6
Graduate students	137	22.8
PhD Candidates	64	10.6
<i>Have you ever taken courses of Seismology/ Geophysics in your University?</i>		
Yes	116	19.3
No	485	80.7
<i>In which seismic hazard zone do you live/study? (see Figure 2)</i>		
Zone I	372	61.9
Zone II	204	33.9
Zone III	20	3.3
I don't know	5	0.8
<i>Age of residential building construction</i>		
Before 1960	36	6
Between 1960-1995	264	43.9
Between 1995-2000	85	14.1
After 2000	154	25.6
I don't know.	62	10.3
<i>Do you work for an authority competent/involved in seismic crisis management/ communication?</i>		
No	561	93.3
Yes	28	4.7
I worked in the past.	9	1.5
Other	3	0.5

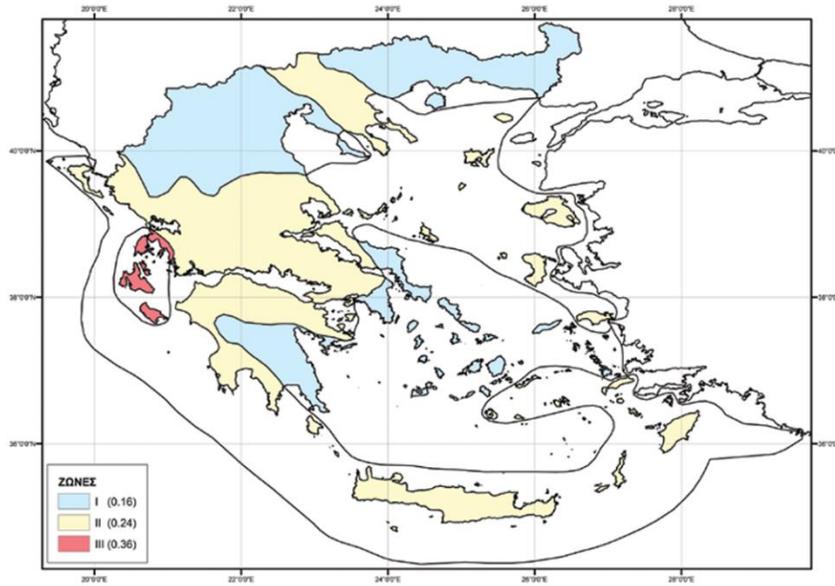


Figure 2. The Seismic Hazard Map of Greece (source: EAK, 2003)

4.2. Basic and empirical knowledge of participants

The present section frames the participants' basic knowledge about earthquakes and earthquake disasters (Table 2). Most participants considered Greece (48.3%) and Türkiye (43.1%) as the most seismically active countries/zones among the five seismically-prone countries of the European part of the Mediterranean region, namely Italy, Greece, Albania, Türkiye and Portugal. Indeed, both countries are characterized by high seismicity rate with a plethora of active faults associated with large and damaging seismic events from antiquity up to the recent past (Ganas et al., 2013; Kassaras et al 2020). In fact, Greece is ranking sixth in the world regarding frequency of earthquake activity (Tsapanos and Burton, 1991). Eastern Mediterranean and Aegean Sea have hosted severe damaging earthquake events (Ambraseys 2008). On the other hand, the very recent double earthquakes of Mw 7.8 and 7.5, that struck southern and central Türkiye and northern and western Syria on February 6th, 2023, are among the strongest and deadliest recorded earthquakes on the Anatolia and Dead Sea area. Rescue efforts as well as the poor building safety standards leading to extensive building collapses have been eloquently illustrated in the media. The influence of this (indirect) empirical knowledge is evident, justifying participants' answers.

Participants were asked to define the causes of earthquake generation from a set of five possible accountable mechanisms described by the literature (Fouglar et al 2018, Table 2). Rupture faults have been selected by the 89.2% (n536) of participants as the main cause followed by volcanic eruptions (n348, 57.9%). Underground explosions are also considered accountable for the generation of earthquakes by the 34.3% (n206) of participants and human activities, mainly

associated with industrial processes, by the 32.8% (n197). Participants' answers indicate good knowledge on the mechanisms responsible for earthquake generation.

An important number of participants (n269, 44.8%) believe that severe earthquakes are always destructive. This is a false impression; factors like earthquake epicenter location, depth, compliance with building regulations are mainly the determinants of the destructiveness of an earthquake (Fokaefs and Sapountzaki, 2022).

Empirical knowledge often results from actual experience. In this regard, participants were asked if they have experienced a strong earthquake in the past (Table 2). For those who did (n253, 42.1%), "panic and fear" were what they recollected more than any other memory (n147/253, 58.1%). The next memorable adversity has been problems of communication (n26/253, 10.3%) and coordination of the competent services (n29/253, 11.5%).

Table 2. University Students' basic and empirical (previous experience) knowledge regarding earthquakes.

Which is the country with the highest seismicity in Europe-Mediterranean region?		
<i>Answers</i>	n	%
Italy	40	6.7
Greece	290	48.3
Albania	3	0.5
Türkiye	259	43.1
Portugal	3	0.5
Other Answers	2	0.3
I don't know	4	0.7
Are severe earthquakes always destructive?		
<i>Answers</i>	n	%
Yes	269	44.8
No	304	50.6
I don't know	28	4.7
What causes earthquakes? (Multiple choice question)		
<i>Answers</i>	n	%
Rupture faults (plate tectonics)	536	89.2
Volcanic eruptions	348	57.9
Underground explosions	206	34.3
Collapses	118	19.6
Induced Quaking (Human Activities)	197	32.8
Other answers	30	5
Have you experienced a strong earthquake?		
<i>Answers</i>	n	%
Yes	253	42.1
No	348	57.9
If yes, what do you remember the most?		

<i>Answers</i> (n253, see answers to the previous question)	n	%
Panic and fear	147	58.1
Relatives' injury	4	1.6
Communication problems	26	10.3
Home damage	16	6.3
The coordination problems of the competent services and the insufficient provision of assistance	29	11.5
Seismologists' controversies	18	7.1
Other answers	8	3.2
No answer	5	2.0

4.3. Worry about earthquakes

Participants were asked to rate their level of worry for nine different types of hazards and the findings are illustrated in Figure 2. It was found that participants are mostly concerned about hazards related to fires (Mean value M3.17) (Table 3), followed by heat waves-droughts (M2.95), earthquakes (M2.92), which generate an almost equal level of worry, and pandemics-diseases (M2.84). Papagiannaki's et al 2019 findings on the level of worry about wildlife fires and earthquakes are similar. Rates of worry for the other hazards are lower than the all-hazards worry average (M2.55). In fact, typhoons induce the lowest level of concern to the participants (M1.44) which is expected given that Greece is rarely hit by typhoons resulting in a low risk perception. The results also show a statistically significant association between gender and the level of worry about earthquakes, suggesting that females express higher level of worry about earthquake hazards ($p < 0.05$).

The catastrophic forest fires of July 2018 and August 2021 may be accountable for the highest level of worry about fires. Worth noticing also is the clear impact of the COVID-19 pandemic crisis on participants answers' indicating that young men and women are equally worried about public health as other types of environmental risks and disasters.

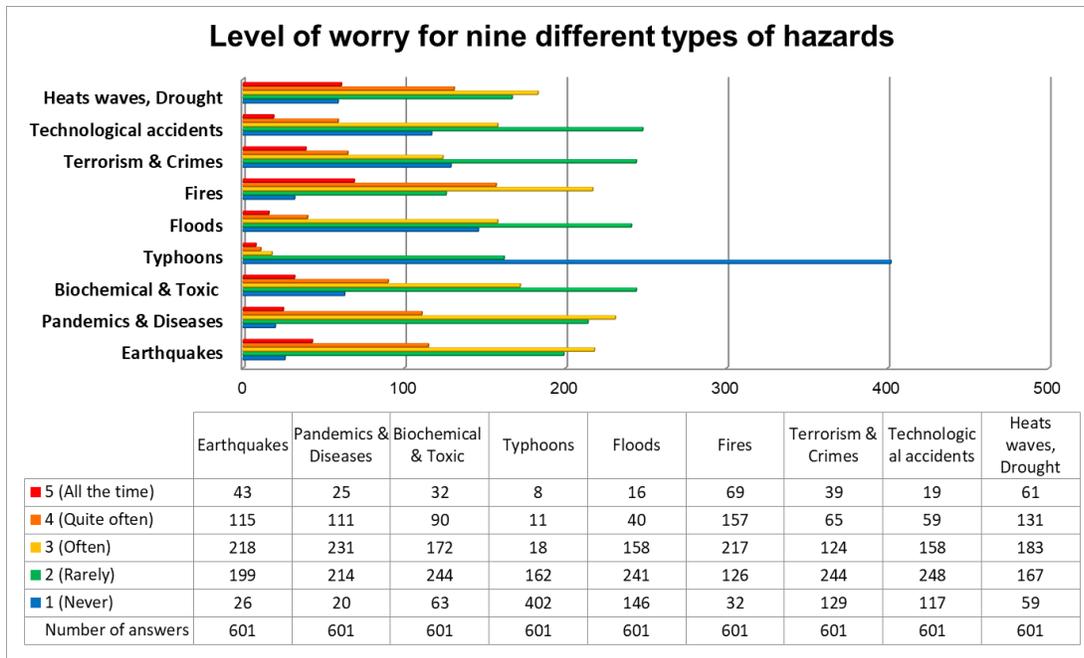


Figure 3. Bar graphs illustrating participants’ level (frequency) of worry about nine different types of hazards (natural, public health and manmade). The number of answers is included in the table attached below the graphs. A 5-point Likert scale was used to rate the level of worry, from 1-“Never” to 5-“All the time”.

Table 3. Mean values of participants’ worry about nine different types of hazards (n= Number of answers, M=Mean value, SD= Standard deviation).

Type of Hazard	n	M	SD
Pandemics - Diseases	601	2.84	0.90
Biochemical & Toxic	601	2.64	1.03
Earthquakes	601	2.92	0.99
Typhoons	601	1.44	0.76
Floods	601	2.23	0.98
Fires	601	3.17	1.06
Terrorism - Crimes	601	2.40	1.13
Technological accidents	601	2.36	1.00
Heats waves, Drought	601	2.95	1.14
All-hazards worry	601	2.55	0.52

For participants who claimed to worry often, quite often and all the time (frequency of worry ≥ 3 , n376) about earthquakes, there has been an attempt to identify the reasons of their worry (multiple choice question). Their answers are illustrated in Figure 3. Personal and the familiars’ safety was proved to mainly generate feelings of worry and concern among participants. Lack of trust and confidence in competent authorities’ efficacy is also highlighted as a major issue as well as

insecurity related to home damage and financial difficulties to reconstruct. 66.2% of participants with intense worry (n249/376) are women but no statistically significant correlation was found between gender and the adoption of measures ($p>0.05$). Less than half of them (44%) took at least one protective action against earthquakes in the past year.

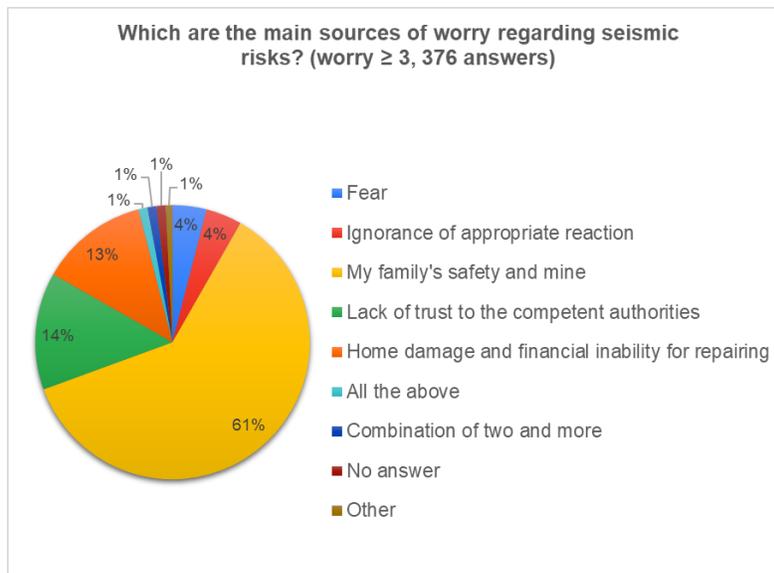


Figure 3. Participants’ answers regarding their main sources of intense worry about earthquakes (worry ≥ 3 , multiple choice question)

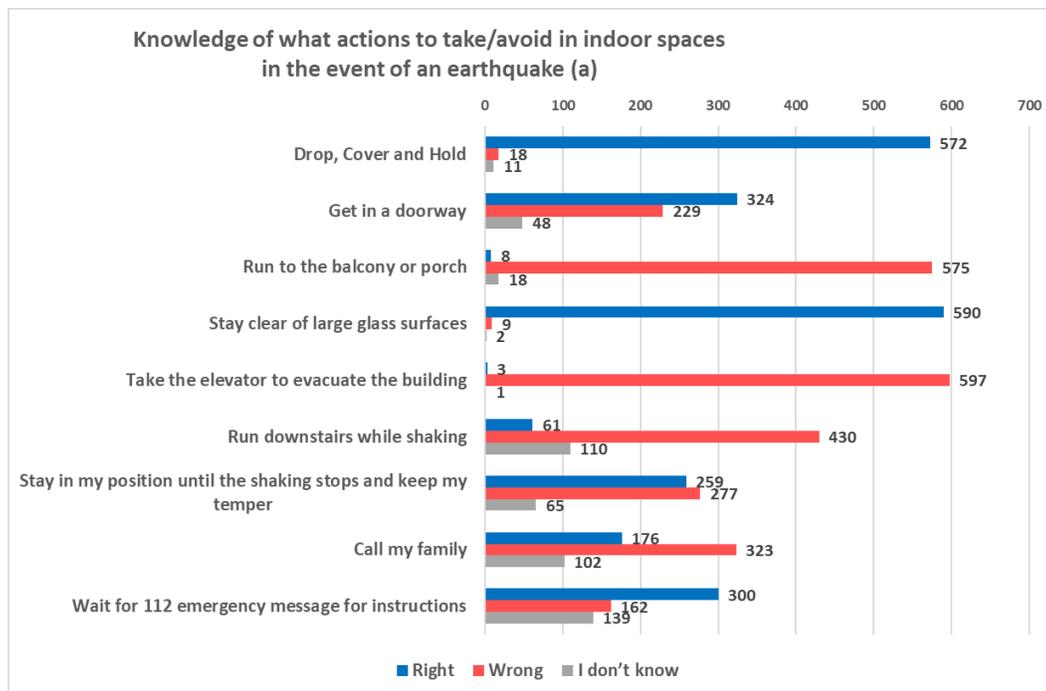
4.4. Preparedness and self-protection measures

It has been argued by several scholars that knowledge influences risk perception, attitudes and self-efficacy (Wachinger et al. 2013; Ao et al., 2021). To evaluate university students’ basic knowledge on preparedness and protective measures, we asked them to determine whether a specific protective action is correct or incorrect in the case of an earthquake event while being indoors (Figure 4a) and outdoors (Figure 4b). From a set of fifteen (15) questions, it was found that all participants know at least one correct action to take (or avoid taking) in both cases. We assigned point value 1 to each correct answer to measure participants’ knowledge on protective actions. The average score was calculated 11.5/15. Those who scored higher to this set of questions (score ≥ 13 , n199), were women (n120/199, 60.3%) but no significant association between gender and knowledge on protective measures exists according to our results ($p>0.05$).

“Drop, Cover and Hold” is the current leading official earthquake protection instruction in developed countries to reduce injury and death during earthquakes (Rapaport and Ashkenazi, 2019). This, most widely recommended, earthquake safety action is acknowledged by the majority of university students. It is also recommended by protective action campaigns and implemented in drills and emergency preparedness exercises (Vinnell et al 2020). 95.2% of the participants (n572) considered this action appropriate. The same applies for “Go to an open area” (n592, 98.5%) and

“Move away from the coast” (n511, 85%) recommendations. However, a knowledge gap has been identified. Finding shelter under doorways in closed spaces has been a persistent perception for safety until recently. More than half of the participants believe that they are safe getting in doorways (n324, 53.9%). Doorways though are non-structural systems and are considered by recent literature as weak points that can be often the point of collapse initiation of interior walls (Goltz et al 2020) and should be avoided. While poor standard building constructions are mainly accountable for casualties, there is ample evidence that injuries result also from evacuation attempts during tremors or even immediately after the earthquake (Sari et al 2023).

A knowledge gap in subordinate response actions has been also evident. An important portion of participants (n176, 29.3%, Figure 4a) consider calling their family on the phone as a correct action to undertake in the case of an earthquake. However, official recommendations opt for texting against calling as a wiser way to contact (the message will eventually reach recipient) causing only a light footprint to the telecommunication network, the unobstructed operation of which is crucial for the emergency services. Indeed, text messaging (e.g. SMS, Social Platforms etc) has entered the crisis management practice taking advantage of the asynchronous communication benefits. Most participants acknowledge waiting for instructions from the 112 European Emergency Number in both cases (indoor and outdoor). Nevertheless, an important number of university students do not feel like waiting for the emergency message (n162, 26.9%, Figure 4a and n113, 18.8%, Figure 4b) and it is noteworthy that many of them claim uncertainty about the relevance of instructions through the Emergency Number (n139, 23.1%, Figure 4a and n131, 21.8% Figure 4b).



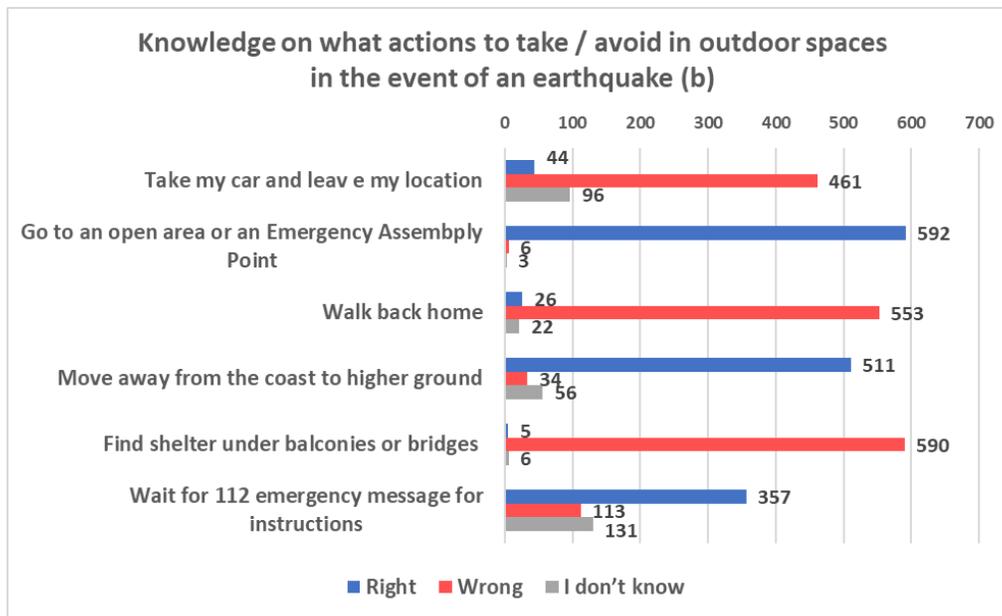


Figure 4. Participants’ answers regarding actions to be taken (or not) in the event of an earthquake in indoor (a) and outdoor spaces (b); Right/Wrong quiz type questions.

A principal goal of this research is to identify the dominant factors that motivated university students to take preparedness actions against earthquakes in the past year. 39% of participants (n236) have taken at least one protective action. Their undertaken actions, chosen from a predefined list of answer options, are mentioned in Table 4. The majority of the students who have taken a measure in advance have prepared an evacuation plan for the case of earthquake emergency (n134/236, 56.8%), followed by the preparation of emergency supplies (n104/236, 44.1%) and fixing of hanging objects (n93/236, 39.4%). The majority of these participants were women (60%) and the average level of worry about earthquakes is 3.1 (mean value of worry).-According to the results, there is significant association between past experience and the level of worry to the adoption of protective actions ($p < 0.001$, $p = 0.001$ respectively). However, no significant correlation resulted between gender and taking precautionary measures ($p > 0.05$).

More than half of the participants replied not to have taken any preparedness and protective action against earthquakes (n351, 58.4%) and the reasons are explained in Table 4. An important portion of the participants claimed ignorance of the necessary measures to take (n121/351, 34.5%, Table 4). This unexpected claim may have several explanations: lack of access to information or lack of trust in official recommendations. Worth mentioning is also the fact that only half of the participants responding not to have undertaken preparedness and protective actions (n181/351, 51.6%) are likely and very likely to take similar measures in the near future (Table 4). The majority of this group had claimed high level of worry ≥ 3 (n123/181, 68%) in a previous question further supporting the interplay between worry and the adoption of protective actions. The Hazard Zone of residence did not influence the decision for undertaking protective actions according to our results; more than half of the participants living/studying in Zones II and III (n224/601) (Figure 2) have not taken any protective action in the last twelve months.

The results show that the most common ways of preparation that participants reported were those of low or no cost and easy to adopt, but still extremely vital. Only 32 participants realized anti-seismic reinforcement of their houses but no correlation has been proven with the age of their residential building construction, or the seismic hazard zone they live in. The impact of personal psychology factors is evident (n134/236), followed by previous experience of a strong seismic event in Greece and worldwide (n105/236 and n84/236 respectively) (Table 4). 14 answers (2.3%) were excluded from the analysis of this question because they were considered contradictory and invalid (Table 4).

The concern about the current energy crisis (Ozili and Ozen 2022) is captured by participants' answers. Most of them stated a preference on energy upgrade (n323/601, 53.7%) instead of the anti-seismic reinforcement of their houses (n278/601, 46.3%).

Table 4. University Students' preparedness and protective actions and future intentions.

Did you take any preparedness protective action in your daily life in the last 12 months?			
<i>Answers</i>	n (total	%	
	601)		
Yes (at least one action)	236	39.3	
No	351	58.4	
Other (controversial) answers.	14	2.3	
<i>If yes:</i>			
What protective actions have you taken in the past year against earthquakes? (Multiple choice question, n236)			
<i>Answers</i>	n	(total	%
	236)		
Fixing hanging objects	93		39.4
Preparation of an evacuation plan in case of emergency	134		56.8
Anti-seismic reinforcement of my house	32		13.6
Preparation of emergency supplies (e.g. water, flashlights etc)	104		44.1
What did it drive you to take preparedness protective actions? (Multiple choice question, for n236 answers)			
<i>Answers</i>	n	(total	%
	236)		
Strong earthquake in Greece in the past	108		45.8
Awareness activities in my University	40		16.9
My studies' relevant object	34		14.4
My participation in a volunteer group	14		5.9
Personal psychological factors	134		56.8
Strong earthquake that occurred in another country	81		34.3
Predictions released for upcoming major earthquake	42		17.8
Preparation for another risk	66		28.0

*If no:***Participants' justification for not taking preparedness protective actions against earthquakes in the past year (for n351 answers)**

1.1

<i>Answers</i>	n	(total %
	351)	
I feel safe at my house.	72	20.5
I didn't know what necessary measures to take.	121	34.5
I believe that the authorities will give instructions on necessary protective measures when necessary.	35	10
I do not think that I will experience an earthquake in my area.	57	16.2
I neglected it/ did not think about it.	22	6.3
No answer (Null).	33	9.4
Other answers.	11	2.8

How likely or unlikely do you consider taking protection and preparedness measures in the near future?

<i>Answers</i>	n	(total %
	351)	
Very likely	35	10.0
Likely	146	41.6
Somewhat likely	131	37.3
Very unlikely	28	8.0
Neither likely nor unlikely	11	3.1

If you had to choose between an energy upgrade of your house and an anti-seismic reinforcement (at the same cost), what would you prefer?

<i>Answers</i>	n	(total %
	601)	
House energy upgrade	323	53.7
House anti-seismic reinforcement	278	46.3

Communication preferences during seismic crisis

Among the objectives of the present work was to explore participants' level of trust towards competent authorities, the scientific community and the media in the case of an earthquake emergency. According to the results, 70.9% (n426) of the university students consider scientists trustworthy for communicating protection information after an earthquake (n426, 70.9%, Table?) followed by the emergency operators (n370, 61.6%, Table 5). Trust in competent authorities and public bodies at central, regional and local level tends to be lower. The results coincide with the results of Ipsos Global Trustworthiness Index 2022 (ISPS 2022) where a relatively high trust has been reported towards the scientific community by more than 18k survey participants from 28 countries all over the world.

Table 5. Participants’ answers regarding seismic risk/ crisis information and communication preferences.

Whom do you trust to give you protection guidelines after an emergency? (Multiple choice question)		
<i>Answers</i>	n	%
The Ministry for Climate Crisis and Civil Protection (Central Government)	314	52.2
The Regions of Greece or Municipalities (Regional and Local level)	152	25.3
Scientists	426	70.9
Private Engineers	90	15
Family and friends	35	5.8
The Media and Social Media	49	8.2
Emergency Operators (Police, Fire Service etc)	370	61.6
None of the above	31	5.2
Other answers	7	1.2
How do you choose to obtain information after an earthquake (about the size, epicenter, impact, first assessments, protection measures, instructions, etc. – Multiple choice question)		
<i>Answers</i>	n	%
TV	239	39.8
Radio	102	17
News Papers	20	3.3
Direct call to competent authority	49	8.2
News websites	407	67.7
Authorities’ official webpages and social media	356	59.2
Seismologists’ social media	240	39.9
Applications or/and warning messages in cell phones	237	39.4
Family and friends	64	10.6
Other answers	2	0.3
Do you have an application in your smartphone for a real time earthquake alert?		
<i>Answers</i>	n	%
Yes	65	10.8
No	242	40.3
I did not know that this kind of app exists	293	48.8
Have you recently seen, heard or read any information or campaign about earthquake protection?		
<i>Answers</i>	n	%
Yes	190	31.6
No	346	57.6
I don’t remember	65	10.8

If yes, indicate source/ means (Multiple choice question)

<i>Answers (n190, see answers to the previous question)</i>	n	%
TV	75	39.5
Social Media	60	31.6
The Internet	101	53.2
Information campaigns from Volunteering Teams	26	13.7
My workplace	23	12.1
The University	71	37.4
A printed material (a campaigns flyer or poster)	41	21.6
A person I know (relative, friend, colleague etc.)	17	8.9
The European Emergency Number	24	12.6
I don't remember	2	1.1
Other answers	2	1.1
No answer	2	1.1

The results indicate that, internet sources (webpages and social media) are the most popular means of receiving and sending information for youngsters. Preference in the traditional sources of information, such as TV, radio or printed newspapers has declined over many years. Indeed, social media isn't just about entertainment. It has been documented that their role in crisis communication and management as an information propagator is essential (Babatunde et al 2022). Media system dependency (MSD) theory states that “in an ambiguous situation, dependency on mass media increases because mass media outlets are likely to contain important and exclusive information that is not available from other sources” (Ball-Rokeach, 1998).

Despite the clear preference for internet and social media sources, only 10.8% (n65/601) of the participants have a real time earthquake alert application in their smartphone. In fact 48.8% (n293/601, Table?) did not know even the existence of such an application. The idea of this kind of application is that when an earthquake is detected, an alert message is sent to all the smartphones within the affected area. Such applications operate in many countries worldwide like USA, Japan and New Zealand (Strauss and Allen 2016, Cremen and Galasso 2020). This practice has been proven extremely useful not only to critical infrastructure operators such as train services (Dallo et al 2022) but also to the public offering a wide range of timely and reliable information (earthquake parameters, tsunami warning and safety tips, available shelters and assistance in the case of disaster) (Fokaefs and Sapountzaki 2021). In Greece, a similar application known as Seismicity-NOA application has been released by the Geodynamic Institute of the National Observatory of Athens in 2021.

Participants were asked what they would like to be informed about, before and in time of an earthquake emergency among a set of predefined options. Their answers are summarized in Figure 5. It was found that more than half of participants are mostly (absolutely) interested in being informed about the proper protective actions in time of earthquake emergency (59.9%, n360/601) as well as the ways to communicate and protect their family and friends (59.6%, n358/601), followed by precautionary measures (47.9%, n288/601).

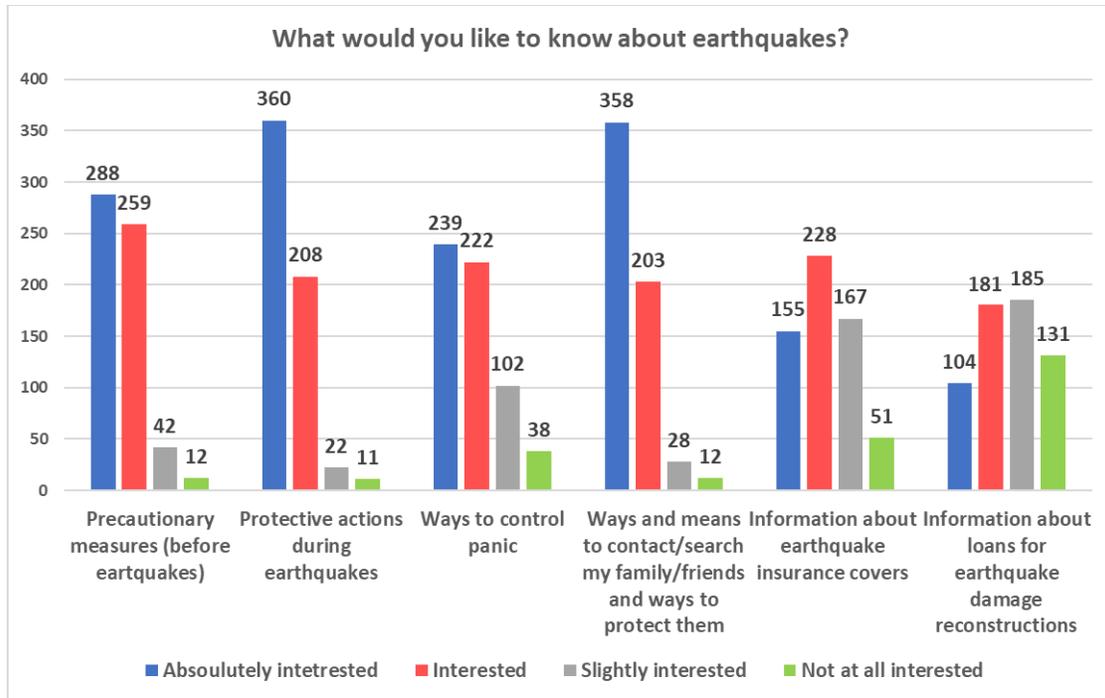


Figure 5. What participants would like to know about earthquakes.

Only a small portion of participants consider earthquake predictions announced on the Internet, Social Media and by the Government as completely trustworthy (Figure 6). However, earthquake predictions are not considered trustful by most participants. In fact, with respect to seismic prediction, the Government is acknowledged a barely trustful source exactly as the Internet, Social Media and TV. Mouth-to-mouth predictions are regarded as rumors (n428, 71.2%, Figure 6).

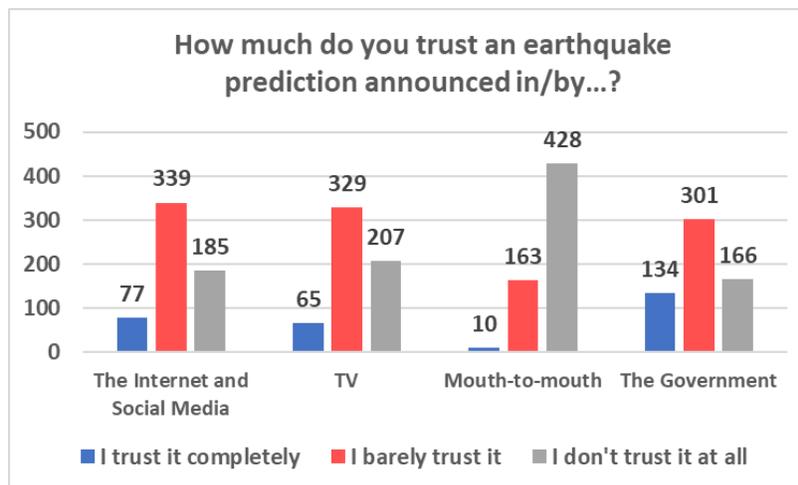


Figure 6. Participants’ level of trust regarding earthquake prediction announced by different sources.

5. Discussion and conclusions

With the occasion of recent seismicity in Central Greece, e.g. the 2020-2021 seismic swarm activity in Thiva as well as the one during September 2023 in the Corinth Gulf scientists have pointed out -mainly through the media- the increased likelihood of a strong earthquake to strike Greece in the near future. Thus, questions are raised about the level of preparedness of individuals and organizations.

Focusing on young age population groups, in particular students from the Universities in Greece, the present study provides an overview of risk perception, in terms of knowledge about earthquakes and earthquake preparedness self-protection measures, previous experience and the level of worry on the basis of an online survey results. This research targeted also the protection behaviors and preparedness actions of youngsters, especially the drivers of these actions in connection with the components of seismic risk perception. The present study findings are considered a fundamental input for every earthquake disaster preparedness plan to build an earthquake resilient community.

Participants seem to share high knowledge on preparedness and response actions, but this does not result necessarily into taking preparedness protective actions against earthquakes. More in particular, most of them know exactly what actions to take/avoid in indoor and outdoor spaces in the case of an earthquake event; they even know what actions carry uncertainty, like for instance waiting for the 112 emergency message instructions or staying still in their position until the shaking stops. However, the survey revealed that only a small portion of participants have undertaken preparedness protective actions and these involve basically low cost and easy to adopt measures. Personal psychology factors and previous experience with a strong seismic event are found to be the main drivers of preparedness actions. This calls for an effective communication strategy to encourage university students to develop a culture on disaster preparedness in proportion to the proneness of the country to earthquakes. After all, according to the Social Learning Theory, in the absence of personal experience, other people's behavior, both preparing for and responding effectively to disasters, may function as a prototype to trigger similar ways of action by those people who lack personal disaster experience. Furthermore, the campaigns for raising awareness on emergency disaster preparedness may include and communicate cases of personal experience with disasters.

The increasing frequency of Climate Change (CC) related hazards and disasters (like forest fires and probably pandemics and health risks) seem to gradually overshadow the concern / worry of youngsters for the rest, including earthquakes. This is a major issue that should be taken into account by future communication strategies for seismic crises and disasters. There are differences between men and women regarding the level of seismic risk perception. It seems that women worry more about seismic risk, but this does not translate necessarily into practical protective actions (compared to the respective initiatives by men). Regarding the demand for seismic information most participants seem to be interested for information that mainly involves the response phase, in particular self-protection actions and ways/means to contact family and friends during earthquakes. This evidences a lack of a seismic disaster prevention culture among the university students, a finding that is further supported by only a small portion of the students reporting anti-seismic reinforcement of their house in the recent past. It is also supported by the low interest of the respondents in earthquake insurance. Lack of a prevention culture is partly justified by the

young age of the survey participants but it reflects also a similar trend in the wider Greek society as reported by other studies. Thereupon, the communication strategy on seismic risk/crisis information should focus by priority on promoting a prevention culture in parallel with the diffusion of knowledge on alternative and complementary preparedness actions that enhances response capacities.

Scientists and emergency managers are among participants' most trusted groups to guide the public in the case of a seismic crisis. This is in accordance with the results of the Ipsos Global Trustworthiness Ranking, 2022, according to which, scientists are the second most trustworthy group of advisors after doctors in 28 countries around the world. It remains to be confirmed whether this preference for scientists is valid for all youngsters and the wider society (not only university students). Should this be the case communication strategies should involve a wide range of scientists and ensure public's access to the best scientific evidence and expertise, taking care not to confuse the public with scientific controversies.

Regarding the best means/channels of communication, the survey reveals participants' significant preference on internet sources for receiving and sending information related to earthquakes and earthquake disasters. After all, communicating risk/crisis information using modern means, like social media is a de facto reality. These means are becoming always more popular for early warnings, emergency public alerts and guidelines. However, there is a necessity for quality and reliability control of the information posted on social media; announcements containing unverified information or fake news may spread fear and panic and cause unnecessary activation of emergency responses like evacuations.

An important number of participants claimed not knowing whether waiting for instructions by the European Emergency Number 112 (via SMS) is an appropriate response. This alert method was set in operation in Greece by the Greek Civil Protection in August 2019, in view of high risk originating from forest fires. It seems that university students would not necessarily opt to wait and consequently follow the instructions given by the European Emergency Number, indicating that while scientists and emergency managers enjoy wide public acceptance, trust to the Governmental authorities issuing instructions is still an open issue.

Moreover it has been obvious by the survey's results that most participants are skeptical to earthquake predictions regardless of the issuing source; it should be noted though that participants who do express trust in these announcements accredit the Government as a credible and reliable source (n134, Figure 6) compared to the Internet, Social Media (n77, Figure 6) and TV (n65, Figure 6). It seems that when Government announcements are based on consultancy from scientific agencies the latter lend credibility and trust to the Governmental authorities. Untrue information (rumors) are rejected by the overwhelming majority of the university students; after all it has been documented that education significantly contributes to combating of rumors (Afassinou 2014; Lai et al., 2020).

University students are highly skilled members of the broader youngsters' community, and they should enjoy a leading role in crisis communication strategies. They should be considered a comparatively reliable "transmitter" of risk/crisis information because of their continuously advancing skills for information seeking, abstract reasoning and anticipation. The current survey documented that (a) they are knowledgeable of the seismic disaster's causal origins and the proper responses during a seismic event in both indoor and outdoor spaces; (b) they can take advantage of the modern and technologically advanced means of communication like the social media, the internet and the mobile phone applications for emergency messages while remaining cautious for

unverified rumors and fake news; (c) they can filter information and separate the scientific from the non-scientific content of it; (d) they can understand uncertainty as a fundamental component of disaster risk. It becomes obvious that further research is needed on how university students could become the principal agents of more intense and reliable seismic information campaigns and hence a key-component of future seismic crisis communication strategies.

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Exploring the Crisis behind the Employee Experience (EX) in the Greek Hotel Sector: Preliminary Findings from a Qualitative Study

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Abstract. This study examines the current crisis in the Greek tourism and hospitality sector, focusing on employees' experiences amid staffing challenges. Using qualitative methods, including expert interviews and staff focus groups, we investigate the factors behind increased demand for hotel employees and low workforce response. Our preliminary findings reveal a critical situation threatening the reputation of Greek tourism services. The research highlights the importance of strategic crisis management and reputation recovery in post-pandemic Greece, emphasizing the role of both internal and external organizational crisis communication. We propose a comprehensive continuity plan, incorporating risk assessments and business impact analysis, as essential for the sector's resilience. We also emphasize the importance of stakeholder collaboration in adapting to these challenges. This study contributes to understanding crisis management in tourism, particularly regarding labor shortages and their impact on service quality.

Keywords: employee experience (EX); crisis management; qualitative research; tourism and hospitality industry; tourism reputation; reputation recovery

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1. Introduction

The Tourism and Hospitality (T&H) industry is currently undergoing unprecedented changes. The rise of digital technologies (Iranmanesh et al., 2022), global economic instability (Crespi-Cladera et al., 2021), geopolitical conflicts (Kazakova & Kim, 2021), and labor shortages in several countries (Morosan & Bowen, 2022) are among the major forces impacting this significant sector of the global economy. In this context, delivering enhanced customer experiences has become more crucial than ever, as it serves as a key differentiator in an increasingly competitive market (Sugathan & Ranjan, 2019). Furthermore, in an environment marked by economic uncertainty and labor shortages, exceptional service can mitigate operational challenges by fostering positive word-of-mouth communication and encouraging repeat business, ultimately contributing to the long-term sustainability and profitability of the industry (Cetin & Dincer, 2014; Kuppelwieser et al., 2022).

Customer experience (CX) in the T&H industry, significantly influencing guest satisfaction (Gopalan & Narayan, 2010), brand equity (Yang et al., 2015), and financial performance (Klink et al., 2021). As travelers become more discerning and their expectations evolve, the ability of a hotel to deliver personalized and memorable experiences is paramount. Berezina et al. (2016) affirmed that the performance of hotel employees is closely related to customer overall experience and satisfaction. Moreover, in a digital age where online reviews and social media can enhance both positive and negative experiences (Li et al., 2022), the quality of customer service can directly impact a hotel's visibility and appeal in the market.

Building on the importance of CX, it is equally vital to acknowledge that the quality of service provided to guests is deeply intertwined with the experiences of the employees delivering that service. Employee satisfaction can moderate customer satisfaction and purchase intention (Evanschitzky et al., 2011), while the effects of a better customer satisfaction, as a result of a better employee experience (EX), can lead to a more engaging EX (Pine II, 2020). Additionally, when employees are well-supported, motivated, and feel a sense of belonging within their workplace, they are more likely to go above and beyond in their roles, leading to higher customer satisfaction and loyalty levels (Brown & Lam, 2008).

Therefore, investing in strategies that enhance customer experience is not just a competitive advantage but a necessity for long-term growth and resilience in the hotel industry (Ali & Omar, 2014). Thus, the investment in creating a positive employee experience not only enhances operational efficiency but also reinforces the customer-centric focus of the hospitality sector, driving both employee retention and guest satisfaction (Ashton, 2018).

By emphasizing the importance of the impact of EX on CX and vice versa, this paper aims to explore the current developments in the tourism industry, focusing on the increased demand for hotel staff and the low response of the workforce in this sector in Greece, with the corresponding implications for the co-creation of CX and EX. The purpose of the present research is to diagnose and address this crisis phenomenon, along with the consequences for the image and reputation of tourism services in Greece.

In this context, qualitative research was conducted with 10 in-depth interviews with experts from hotels (luxury, resorts, 4-5 stars in Greece, with a range of employee numbers from 14-20,000+ individuals). Subsequently, a focus group was conducted with back- and front-office staff to compare and validate the data collected from the in-depth interviews with industry experts and to draw appropriate conclusions (Yang et al., 2012).

2. Literature review

2.1 Crisis Communications in Tourism

The term "crisis" comes from the Greek word "krisis," which translates to "turning point" or "decision." According to Santana (2004), a crisis is something that disrupts the normal cycle. In the context of a disaster, well-being is closely tied to the provision of basic needs, such as food, water, shelter, and security (Finsterwalder, 2010; Henderson, 2007). Elements of well-being may also include the absence of negative effects such as tension, fear, pressure, and anxiety (Kuppelwieser & Finsterwalder, 2016). Tourism and recreation play an important role in economic activity. In recent years, tourism has emerged as one of the most significant economic sectors for job creation and global socioeconomic and cultural development. It serves as a sustainable alternative approach for long-term economic viability and diversification in key sectors, as well as for sound government policies (Alnoor et al., 2020; McCabe & Qiao, 2020).

Current literature presents two approaches to crises and disasters in the hospitality industry and at the level of individual hotels. One approach focuses on business efforts to maintain operations during transformative events related to crises and disasters. Specifically, for hotel businesses, maintaining operational functions during a disaster or crisis is often described through the lens of resilience (Brown et al., 2017). Many of the narratives about the operational aspects of hotel services refer to disaster recovery plans, which are typically published as operational guides and best practice manuals distributed through professional associations (Lagiewski & Čović, 2022).

As crises alter social structures (Buckley, 2008), participants shape and are shaped by the crisis and subsequent interactions. Changing business conditions present both challenges and opportunities to continue serving customers (Niemimaa et al., 2019). Siomkos & Shrivastava (1993) argue that since crises impact virtually all aspects of businesses, a comprehensive and multidimensional response is desirable. To assess the effectiveness of business responses to crises, we define "success" as the recovery from crisis conditions with minimal damage to the organization's resources, goals, and image. By incorporating issues such as equal opportunities for employees, environmental protection, charitable support, and fair treatment of minorities (McWilliams & Siegel, 2001), a company could shield itself from crises, as the reputation built from CSR may protect the company's image.

According to (Sausmarez, 2007a) crises can be categorized into three time periods:

- **Potential Crises:** These are threats that may arise in the future but are neither currently evident nor existing. Identifying and considering these threats is essential for preparation should they materialize.
- **Latent Crises:** These are ongoing critical situations that exist but have not yet caused measurable negative effects.
- **Acute Crises:** These are situations where the destructive impact is clearly visible and measurable.

Laws and Prideaux (2005) further proposed a regional typology of crisis:

- At the regional level, a crisis primarily impacts the local area and possibly extends to the nation.
- At the national level, the effects become significant for the entire tourism industry of a country.

Crisis management can be either active or reactive. Active crisis management involves proactively predicting potential crises, implementing preventive measures, and preparing an action plan for future crises. In contrast, reactive crisis management focuses on addressing crises that are already occurring, latent, or acute, by managing their negative effects with appropriate crisis management tools (Waller et al., 2014).

Crisis management involves several phases (pre-crisis, during a crisis, and post-crisis) and functions (prevention, response, and recovery) (Coombs, 2021). Effective communication is vital, as how crisis-related information is shared among stakeholders impacts public opinion, market sentiment, and individual decisions (Coombs, 2021; Sellnow and Seeger, 2021).

Crises can occur due to various factors, including political unrest, terrorism, wars, natural disasters, public health threats, employee mistakes, poor management decisions, industrial accidents, strikes, and service failures, among others (Sonmez et al., 1999).

2.2 The Role of Employee Experience Management

The concept of Employee Experience Management (EXM), as outlined by Abhari et al. (2008), is pivotal in understanding the dynamics between employee satisfaction and organizational success. EXM is underpinned by three key systems: rewards, training, and empowerment, which collectively lead to outcomes such as brand experience management and experience innovation management. The empowerment of employees fosters an environment where they can respond swiftly to customer requests, leading to increased job satisfaction and more innovative contributions. This empowerment translates into warm, enthusiastic customer interactions and promotes customer loyalty (Bowen & Lawler III, 2006). Recognition systems, which aim to incentivize desirable employee behavior, constitute another critical component of EXM. These systems are closely linked with internal marketing strategies aimed at enhancing job satisfaction (Cheng, 2020; Park et al., 2020).

Employee well-being is also a significant EXM aspect, contributing to a positive EXM (Kaufman, 2008). Furthermore, research conducted by IBM Corporation and Globoforce Ltd (2016) indicates that managing EX effectively motivates employees by providing them with the necessary training and support to continuously innovate.

Workplace practices that influence EX include the environment, work, and interpersonal relationships. A supportive work environment, characterized by positive coworker relationships, enhances EX by fostering a sense of belonging and camaraderie. The concept of "meaningful work" is equally important; it refers to work that aligns with the organization's core values while allowing employees to develop their skills and talents (IBM Corporation ("IBM") and Globoforce Ltd. ("Globoforce"), 2016). Practices such as regular feedback, recognition, and opportunities for growth further enhance the EX by making employees feel valued and motivated. Giving employees a voice in the workplace and the freedom to engage in non-work activities contributes to a more positive EX.

The design of an EX strategy should be rooted in the organization's overall strategic goals, with clear, measurable objectives. It is crucial for the EX strategy to be directly linked to the organization's broader goals, including customer satisfaction, innovation, employee health and safety, and process effectiveness.

A driving force for employee performance is the clear definition of their expectations, which must be aligned with the company (expectations alignment), which is a cause of employee engagement and yields the desired results of fulfilling its goals. Each contract consists of three sub-contracts (transactional contract, psychological contract, brand contract), while all three together determine the quality of the EX (Maylett & Wride, 2017).

2.3 Demographics and Cultural Factor Influences on Employee Experience

Understanding the demographic and cultural factors that influence EX is critical for organizations aiming to optimize their workforce management strategies. According to Meyers et al. (2016) from the Deloitte Center, effectively managing EX involves segmenting employees based on demographics, roles, and performance. This segmentation allows organizations to create tailored experiences that resonate with different employee groups, thereby driving engagement and productivity. Demographic factors such as age, gender, education level, and household income can significantly influence employee experiences.

Research by Kim et al. (2010) and Mak et al. (2012) indicates that these sociodemographic factors play a role in shaping customer experiences, which can vary widely across different demographic groups. For instance, knowledge, motivations, and personality traits can significantly influence how employees interact with customers, which in turn affects the quality of the customer experience.

Cultural factors also play a significant role in shaping employee experiences. According to McColl et al. (2022), cultural factors influence the way service experiences are encoded and recalled, affecting the interpretation of these experiences. For example, cultural values and personality traits can shape the emotional responses of customers during service interactions, particularly in culturally diverse environments such as the hospitality industry (Jani & Han, 2015; Wen et al., 2018). This understanding of cultural influences is essential for organizations aiming to create a more inclusive and effective EX, which ultimately contributes to better customer service and satisfaction. Moreover, a customer's perception is shaped by various factors, including their personality traits, age, birthplace, mobility, and socio-economic background (Pigram & Dunn, 1976).

The IBM and Globoforce Ltd. study (2016) showed that employees with a high experience index are more likely to exhibit high levels of job performance. Additionally, employees with a positive EX are more likely to demonstrate significantly higher levels of discretionary-extra effort. More specifically, a positive EX can contribute to greater motivation to put in extra effort at work beyond conventional responsibilities and duties. Furthermore, employees with positive experiences are less likely to leave their jobs.

2.4 Employee Experience & Communication in Tourism Crisis Containment

According to several reports, the tourism sector in Greece is facing a crisis. Despite an 8.2% increase in international air arrivals from January to July 2024, with over 14.4 million tourists visiting the country, the situation in the hotel industry and local economy is less promising. Hotels have experienced low occupancy rates and uncertainty, leading to discounts and offers, as well as lower per capita tourist expenditures (INSETE, 02/09/2024,

<https://www.fortunegreece.com/article/ellinikos-tourismos-2024-oi-prosdokies-ton-esodon-kai-i-skliri-pragmatikotita/>).

The level of customer-employee interaction is particularly important in high-contact industries, where employees play a direct role in shaping the CX. Wolter et al. (2019) reinforce this by showing that high levels of customer-employee contact amplify the impact of employee satisfaction on customer satisfaction. Customer and employee satisfaction are mutually reinforcing each other, creating a positive feedback loop where satisfied employees provide better service, leading to higher customer satisfaction, which in turn boosts employee morale (Zablah et al., 2016). Understanding and meeting employees' needs is therefore crucial for enhancing service quality and customer satisfaction. Satisfied employees are more likely to treat customers well, provide high-quality service, and contribute to a positive CX (Ahmed & Rafiq, 2003; Berry et al., 1976).

The psychological contract between employees and their organization is another key factor influencing customer service quality. When employees perceive that their organization is fulfilling its promises and obligations, they are more likely to exhibit high levels of customer orientation, empathy, and enthusiasm in their interactions with customers (Harris et al., 2014). This, in turn, enhances CX, leading to increased customer satisfaction and loyalty.

By understanding and optimizing EX, organizations can create a more engaged, motivated workforce that is better equipped to deliver exceptional customer service.

According to the literature review, the crisis in the Greek tourism sector, can be characterized as an acute, national-level crisis. It can be addressed through: (a) Employer Branding based on internal crisis communication, and (b) Tourism Stakeholder Collaboration Network based on external marketing communication. Both represent Reactive crisis management strategies.

2.4.1 Resilience and Recovery Strategies

Employer Branding

Internal crisis communication is crucial for building trust with employees, fostering a positive work culture, and improving job satisfaction and performance (Jo and Shim, 2005).

Employer branding (EB), combined with human resource management (HRM) practices, plays a vital role in enhancing organizational performance. EB helps create an appealing employer value proposition, differentiating a company from its competitors, while HRM practices integrate this brand internally to attract and retain talent (Zografou & Galanaki, 2024). EB reduces turnover and minimizes risks, particularly important in the hospitality sector, where talent supply is limited (Kravariti et al., 2022). Key HRM practices—such as selective staffing, training, and performance appraisals—support EB by fostering high employee commitment (Marescaux, De Winne, and Forrier 2019). In addition, strategic EB investments, like social media presence and storytelling,

effectively boost company image and attract socially-conscious talent (Kemp et al., 2023) and/or enhance personal connections and performance (Partanen et al., 2008).

Tourism Stakeholder Collaboration Network

External communication during crises involves sharing information and resources from the organization to external stakeholders, such as government bodies, activists, and rescue forces. It helps coordinate the crisis response and ensures all stakeholders have a common understanding of the situation by providing accurate information (Reilly, 1998).

Carty (2021) introduces a framework for collaboration among tourism businesses and organizations to improve crisis preparedness and management through a Continuity Plan. This plan centers on building a network of stakeholders strengthening the community and tourism industry's resilience during crises.

Key crisis management strategies include Business Continuity, Emergency, Crisis Management, and Recovery Plans, tailored to the tourism sector's needs and focused on risk assessment, impact analysis, and recovery strategies.

The framework also highlights the importance of risk assessment, allowing businesses to identify and adapt to potential threats. Teams in communication and marketing ensure reliable public updates and destination promotion, fostering trust among stakeholders.

2.4.2 The Importance of Corporate Listening | VOE

Internal communication within an organization focuses on change, stress management, training, coordination, and decision-making during a crisis. It helps identify the necessary information and resources to address the situation (Lockwood, 2005). Downward communication enforces control over employees, while upward communication allows lower-level employees to provide updates and suggestions to higher management during the crisis (Reilly, 1998).

The Voice of Employees (VOE) is linked to employee engagement, satisfaction, loyalty, retention, and productivity (Bashshur, 2015; Ruck et al., 2017). VOE focuses on human resource management (Conway et al., 2016), organizational communication (Edmondson, 2007), and organizational behavior (OB), serving as a means for employees to communicate as a group with the organization's management (Freeman and Medoff, 1984). Moreover, Warner (2017) suggests that if businesses want to listen to their customers' voices, they must also listen to their employees' voices.

From the perspective of capturing employee insights, the HR department uses annual employee engagement or satisfaction surveys, communication platforms, and the PR department, or internal communication staff responsible for newsletters use employee events, and intranets. Additionally,

accelerator teams play a key role where employees are invited to contribute to innovation in scrums (meetings) as part of "agile" management (Hobbs and Petit, 2017).

The value derived from understanding the voice of customers, stakeholders, and employees is reflected in the conversion rate of detractors to passives and promoters (NPS), increased customer satisfaction with customer service and telephone support, and reduced complaints. Additionally, the percentage of employees staying with the company increases, leading to lower recruitment and training costs for new hires. Through effective and active corporate listening and information dissemination within the organization, insights, understanding, and engagement are achieved, which, in turn, lead to trust, commitment, and sustainable relationships. The organization functions as a whole, integrating both internal and external communications (Cornelissen, 2017, p. 4).

3. Methodology

3.1 Research Design

This study employed a mixed-methods qualitative research design, incorporating both in-depth interviews with industry experts and a focus group with hotel employees. These two methods were used to explore the factors influencing customer and employee experiences in the Greek hotel sector, as well as their interaction.

The in-depth interviews aimed to gather insights from managerial-level professionals, while the focus group was designed to collect data from front-line employees who directly interact with both customers and management. Together, these methods enabled a comprehensive exploration of the research questions, allowing for the triangulation of data and a deeper understanding of the phenomena under study. The thematic analysis (Braun & Clarke, 2006) and grounded theory approach (Strauss & Corbin, 1998) were used to analyze the data from the interviews and focus group, respectively, with Atlas.ti software assisting in the coding process. The questionnaire for the in-depth interviews consisted of twelve questions (Appendix 1).

3.2 In-Depth Interviews with Industry Experts

Sample

The first study involved in-depth interviews with 10 managers from luxury hotels and resorts (4-5 stars) in Greece (Table 1). These hotels employed between 14 and 20,000+ employees, and the managers held positions at the supervisory or managerial level. The purposive sampling method was used to select participants based on the following criteria:

- Employment in international or local hotels and resorts in Greece.
- Managerial or supervisory roles within the hotel hierarchy.

The sample size was determined based on data saturation, achieved when interview responses began to repeat, offering no new insights (Francis et al., 2010).

Table 1. In depth interviews sample characteristics

ID	Job Position	Gender	Number of Employees	Type of Hotel
1	Social & Corporate Events Manager	Female	10,001+ employees	5-star - Group of hotels and resorts
2	HR Manager	Male	640 employees	5-star
3	FnB Manager	Male	200 employees	Resort (part of a hotel group)
4	HR Director	Male	1,001-5,000 employees	Resort Group
5	Front Office Manager	Female	100 employees	4-star
6	HR Manager-Resident Manager	Male	6,100 employees	Group of luxury hotels and resorts
7	Front Office Manager	Female	14 employees	4-star
8	General Manager	Male	60 employees	5-star Resort
9	Assistant Manager	Male	15,000 (referring to a hotel unit in the group)	Resort
10	Business Consultant, Vice President of the Board	Male	30 employees	4-star Resort

Data Collection

The interviews were conducted between March 2024 and July 2024, averaging 40 minutes each. The interviews were conducted via phone, with participants located both in Athens and on various Greek islands. The interviews followed a semi-structured format with 12 open-ended questions,

allowing for flexibility in rephrasing questions when necessary to clarify responses. Interviews were conducted in Greek, with English terms used where appropriate.

Data Analysis

Thematic analysis was employed to identify key patterns and themes across the interviews (Braun & Clarke, 2006). The data were coded using Atlas.ti software, and word clouds were generated to visualize recurring terms and concepts (Vrain & Lovett, 2020). Data saturation was achieved when no new themes emerged.

3.3 Focus Group with Hotel Employees

Sample

The second study consisted of a focus group involving front-line employees from various roles in the hotel industry, such as waiters, maids, receptionists, and grooms. These employees were selected to represent different operational departments, including both back-office and front-office functions, to ensure a diverse range of perspectives. Table 2 outlines the key demographic characteristics of the focus group participants. The questionnaire was consisted of seven questions (Appendix 2).

Table 2. Focus group sample characteristics

Job Position	Gender	Age	Education Level	Years of Experience	Marital Status	Resident of
Front office agent	Female	30-39	TEI	3-4	Single	Local community
Groom	Male	20-29	University (AEI)	1	Single	Local community
Front office agent	Female	30-39	Master's Degree	8	Single	North Aegean
Housekeeper	Female	40-49	Vocational School (IEK)	7	Divorced	Local community
Front office agent	Female	40-49	Vocational School (IEK)	7	Divorced	Local community

Restaurant Supervisor	Male	30-39	Vocational High School (Tourism)	10	Married with 2 children	Athens
Front office agent	Female	30-39	TEI	3-4	Single	Local community
Waiter	Male	30-39	Vocational High School (Tourism)	10	Married with 2 children	Athens

Data Collection

The focus group interview took place in August 2024 and lasted 164 minutes. The participants were encouraged to recall and share their personal experiences and interactions with employers and customers. Confidentiality and anonymity were guaranteed throughout the process. This group interview allowed for the cross-validation of data collected in the earlier in-depth interviews.

Data Analysis

The data from the focus group were analyzed using grounded theory (Strauss and Corbin, 1998; Glaser and Strauss, 1967). This inductive method was chosen due to its effectiveness in focus group settings (Goulding, 1998). The narrative interpretative method was also employed to interpret the implicit messages in the participants' responses. This approach facilitated a deeper understanding of the phenomena by considering both explicit and implicit insights from the employees.

3.4 Ethical Considerations

For both studies, participants' anonymity and confidentiality were ensured. Informed consent was obtained before each interview, and all participants were informed of their right to withdraw from the study at any time. No identifying information was used in the analysis or presentation of results.

3.5 Research Instruments

The primary research instrument for the in-depth interviews was a semi-structured interview guide with 12 open-ended questions designed to explore the factors influencing customer and employee experiences. For the focus group, the same topics were covered, but the format allowed for group discussions, facilitating the sharing of stories and collective insights. Both instruments were designed to encourage detailed responses and provide flexibility for further probing.

4. Findings

4.1 In-depth interviews

The data analysis revealed three core themes: Customer Engagement, Factors, and Outcomes, each contributing significantly to understanding the dynamic relationship between employee experience (EX) and customer experience (CX) in the hotel industry. Figure 1 presents a graphical illustration of the relationships between the themes and the codes generated through the thematic analysis.

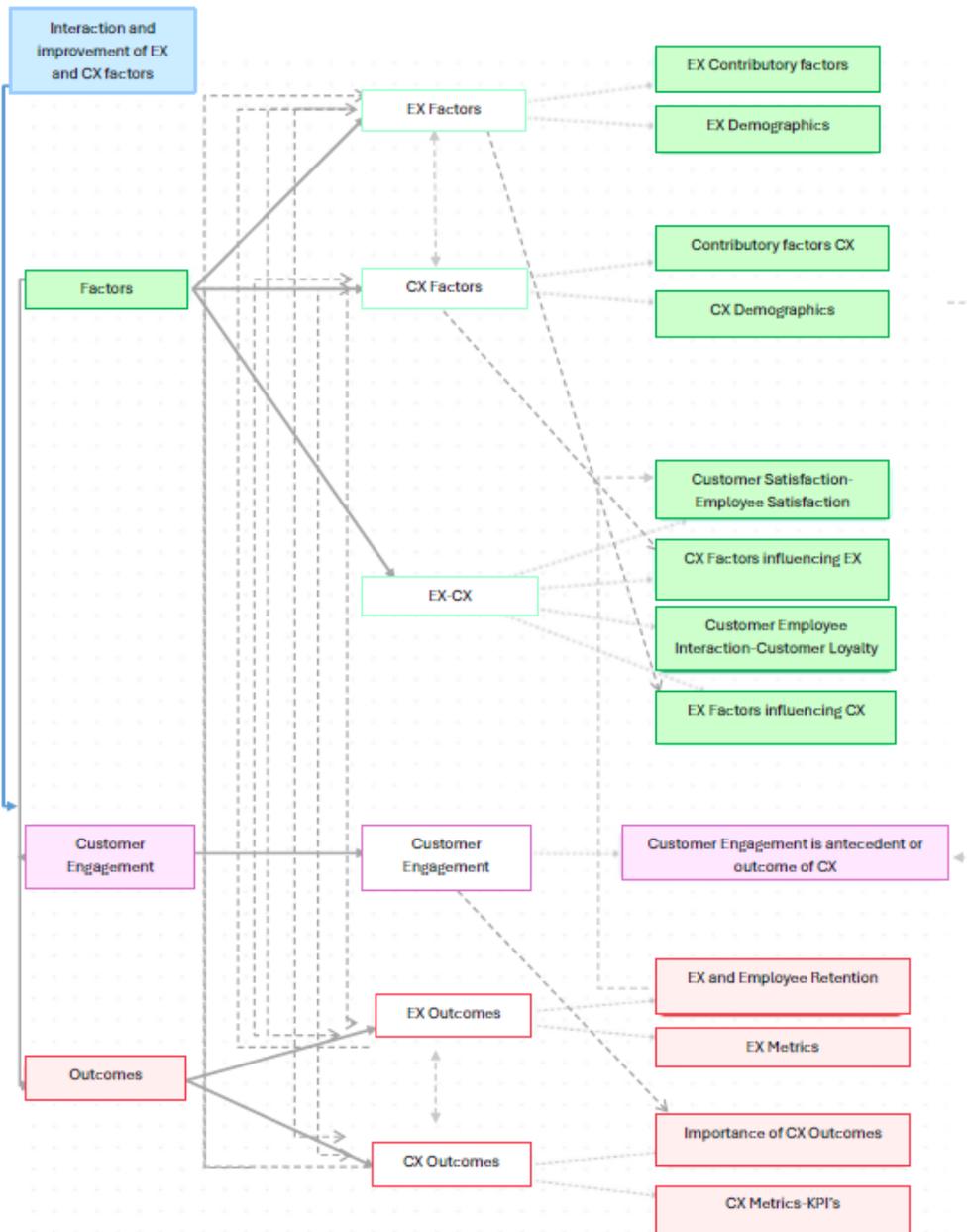


Figure 1. Code analysis from in-depth interviews

Theme 1: Factors Shaping Employee and Customer Experience

The first theme, Factors, encapsulates the elements that influence both employee experience (EX) and customer experience (CX), as well as the interaction between the two. The subthemes identified were:

1. Employee Experience Factors (EX)
2. Customer Experience Factors (CX)
3. EX-CX Interplay, which focuses on how employee and customer experiences influence each other.

Employee Experience Factors emerged as a complex interplay of organizational support systems, leadership, and work conditions. Participants highlighted the importance of employee support in creating a positive EX, emphasizing the significance of fair wages, professional development, work-life balance, and good working conditions. One respondent, underscoring the necessity of organizational commitment to employee well-being, noted:

[...] Work-life balance and support from the organization are critical factors in shaping my experience as an employee [...] (Male, HR Manager).

This finding supports the model proposed by Abhari et al. (2008), which outlines the critical role of reward, training, and empowerment in enhancing employee satisfaction and performance.

Moreover, demographic factors, such as education level, prior experience, and cultural background, were found to significantly impact the employee experience. One interviewee emphasized that:

[...] religion, location, and language can directly influence an employee's ability to integrate into the work environment and impact their satisfaction [...] (Female, Social & Corporate Events Manager).

This observation aligns with Meyers et al.'s (2016) findings, which advocate for the segmentation of employees based on demographics to better understand and meet their needs.

Theme 3: Outcomes of Employee and Customer Experience

The third theme, Outcomes, focuses on the mutual benefits derived from enhancing both EX and CX.

Outcomes of EX were found to include higher levels of employee engagement, retention, and performance. One manager mentioned:

[...] The higher the employee satisfaction, the lower the employee turnover. For this reason, a well-being employee survey is carried out regarding his satisfaction, if he is

overwhelmed by work, if he feels tired, if he has received negative behavior from another employee or customer, if he has enough days off, if the food and accommodation benefits are satisfactory, if he lags cognitively in relation to others [...] (Male, HR Manager).

This observation is consistent with research by IBM and Globoforce (2016), which found that employees with positive experiences are more likely to go above and beyond in their roles, contributing to better organizational outcomes.

Ultimately, these findings contribute to the growing body of literature that stresses the importance of a holistic approach to managing employee and customer experiences, ensuring that both internal and external stakeholders benefit from a positive, well-supported organizational environment.

4.2 Focus groups

The findings from the focus group are consistent with those from the in-depth interviews, revealing critical factors that influence EX. Employees confirmed that key determinants of EX include working conditions and adherence to the terms of agreement by the employer (salary, working hours, benefits, accommodation, and communication), along with opportunities for development, objective employee evaluations, and inter-departmental collaboration. As one employee noted, regarding the essential for a positive employee experience:

[...] adherence to agreed terms (salary, extra-salary benefits), corporate climate, sense of belonging, possibilities for development, relationship with colleagues [...] (Female, 30-39, Front office agent).

The corporate environment, including the sense of belonging, relationships with colleagues and management, and recognition of services by customers, also plays a vital role in shaping EX (Yang et al., 2012).

Question 1

Regarding recent developments in the tourism sector, it was reported in the spring of 2024 that there are 80,000 job vacancies (in hotels and catering). According to the Hellenic Federation of Food, Tourism, and Related Professions (POEET), one of the deterrents to employment in the tourism sector is the intensification of work (from last season), which discourages workers from returning to the sector this year. In 2023, according to a study by the Institute of Tourism Research and Forecasts (ITEP) conducted for the Hellenic Chamber of Hotels, approximately one in five positions in Greek hotels remained unfilled. Most employees clearly state that they are looking for work elsewhere, with equal or even lower wages but with significantly better working conditions. Even businesses that comply with labor standards and collective agreements are struggling to find employees.

Testimonies from employees who participated in the focus group confirm this publication:

[...] wages are low, the five-day work week has been abolished, there are no insurance contributions, working hours are not respected, and conditions for food and accommodation are deplorable. There is no critical care and protection for employees, few workers are available, and there is a lot of work [...] (B)

[...] There is worker exploitation, especially in high-tourism destinations. Conditions are poor, and work experiences are negative. The seasonality, fixed-term contracts, and the need for business owners to hire staff for short periods increase workers' insecurity, especially on islands like Santorini and Mykonos, where burnout, low wages, lack of set hours, and poor conditions are also observed [...] (C)

[...] I have changed hotels twice due to unmet agreements regarding salary and unpaid overtime, as I was placed in roles beyond the one I was hired for due to staff shortages. Even in 5-star hotels, there is low customer quality due to reduced tourism. The quality of clients has decreased—I judge the standard from the waste they leave. In seasonal hotels, workers are affected by the quality of the food provided to them, and there are no days off or breaks. Whereas in Four Seasons hotels, such benefits are provided [...] (D)

[...] After the quarantine period, the situation deteriorated; we were laid off with a subsidy of €500, so workers sought alternative jobs. An eight-hour job elsewhere lacks the special demands of each customer. The collective agreement wage of €880, which eventually reaches €1,000, is not enough; I worry about providing for my home. Salary, client interaction, and working conditions are challenging; the new generation lacks patience and avoids conflicts with colleagues or customers, preferring “smart jobs” or remote work. Additionally, service quality is low in all-inclusive hotels. The selection of providers depends on experience since wages are low [...] €

Question 2

Another issue raised in the focus groups was the factors that would lead employees to remain at a hotel. From the participants' responses and the qualitative analysis, the following factors emerged, which confirm the findings from the previous in-depth interviews with experts in the tourism industry:

- Working conditions and adherence to contract terms (salary, benefits, days off, pleasant environment, food, training, merit-based advancement, objective employee evaluation)
- Corporate culture (relationship with colleagues, sense of belonging, understanding, mutual respect, behavior of colleagues and management, sense of security).

The following employee testimonies illustrate these points:

[...] adherence to agreements (salary, benefits), corporate climate, sense of belonging, advancement opportunities, relationship with colleagues [...] (A)

[...] objective employee evaluation, merit-based advancement, employee training, sense of security, salary, and working hours [...] (A)

[...] salary, working conditions, accommodation, food, benefits, workspace, collegiality, communication, collaboration across departments, hours [...] (C)

[...] salary, days off, understanding, food, mutual respect, behavior of colleagues and management [...] (D)

According to the literature, employee turnover is classified into two categories: voluntary and involuntary turnover (Wanous, 1979). Reasons for voluntary turnover typically involve salary, employee benefits, and the work environment. Employee departure constitutes a loss in human capital, relational capital, and expertise for the organization.

The causes of voluntary employee turnover fall into five main HRM categories:

1. Inadequate recruitment process (Lo and Lam, 2002; Pizam and Thornburg, 2000),
2. Inappropriate job placement (Lo and Lam, 2002),
3. Dissatisfaction with salary, benefits, and job opportunities (Cho et al., 2006; Lo and Lam, 2002),
4. Inadequate HR management (Kim et al., 2010; Cho et al., 2006; Lo and Lam, 2002),
5. Work-related stress, pressure, and burnout (Chalkiti and Sigala, 2010; O'Neill and Xiao, 2010; Shani and Pizam, 2009).

Research on employee turnover in the tourism sector in both island and mainland Greece showed that factors such as unemployment rates, the variety of tourism offerings, seasonality, individual employee attitudes within tourism, and career advancement influence employee turnover rates (Chalkiti and Sigala, 2010). Yang (2010b) argued that factors like stress, burnout, organizational socialization, and job autonomy could impact job satisfaction, organizational commitment, and employees' intent to leave.

Pizam and Thornburg (2000) found that personal dissatisfaction with compensation policies, unmet job expectations, work-family conflict, and limited interpersonal relationships with colleagues affect employee turnover. Motivating factors, such as career development and empowerment, can be helpful in reducing employee turnover (Martin et al., 2006). This research approach aligns with the study by Chiang and Jang (2008), who applied Vroom's Expectancy Theory, demonstrating that intrinsic motivators, such as career progression and employee recognition, have a positive impact on job performance and employee satisfaction.

In this context, George and Gronroos (1989) proposed internal marketing strategies, including:

1. Management support for staff and encouragement of market-oriented behaviors,
2. Training and skill development for employee growth,
3. Internal coordination and communication,
4. Integration of HR with marketing for employee retention and reward,
5. External marketing communication.

Work needs are met through training, development, and motivation, enabling employees to communicate and contribute to the company's objectives for enhancing service quality. Such initiatives help employees provide high-quality services to customers.

Question 3

The following testimonies from the focus group with hotel industry employees confirm the above and shed light on their reasons for leaving other hotels in the past:

[...] Due to a negative experience in the past, I left a hotel business because of a lack of communication at all levels of work. There were no opportunities for advancement; you gave a lot but received nothing in return [...] (A)

[...] Yes, due to a negative experience during a season in the XXX area, because what was agreed upon was not followed through, the accommodation was unsatisfactory, so I left [...] (E)

Question 4

In response to a question (to the employees) about evaluating and describing a positive and a negative experience, some respondents answered as follows:

[...] A positive experience is my current experience at this particular hotel; I give and receive, there is room for growth and support. A negative experience I can mention from the past was where there was no communication at all levels of work, you gave but did not receive, and there were no opportunities for advancement [...] (A)

[...] A positive experience is the friendships and connections with colleagues, and a negative experience is that I was blamed for a mistake made by another department [...] (B)

[...] A positive experience is the teamwork with staff, even under a heavy workload, which leads to high performance through collaboration. Tourism is about people! I have very fond memories of good teamwork. A negative experience is dealing with customers. It's emotionally draining. When a customer realizes you are providing a service, they tend to make demands. They exploit the fact that the hotel provides services and ask for additional perks [...] (C)

5. Discussion

The qualitative analysis reveals a deterioration in working conditions since the pandemic. The workforce supply in the sector has declined, necessitating action to restore and enhance the industry's reputation to attract skilled employees at both the business level and within the broader "tourismscape" (van der Duim 2007). In this context, this study highlights the significant challenges facing Greece's tourism and hospitality sector, particularly in relation to employee experience (EX) in the context of persistent labor shortages. The findings highlight the crucial link between EX and customer experience (CX), showing how inadequate workforce conditions not only harm service quality but also compromise the sector's overall resilience. This connection emphasizes the need for strategic risk management approaches, as the sustainability and reputation of the industry depend on maintaining stable and satisfied workforces capable of delivering high service standards.

The study identifies core issues related to workforce management in the sector. First and foremost, fair compensation, improved working conditions, and organizational support systems emerged as essential for fostering a positive EX. Employees reported that inadequate pay, extended working hours, and substandard living conditions are primary deterrents to staying in the sector. Addressing these basic needs aligns with crisis management principles by reducing employee turnover risk and fostering workforce retention, which is crucial for maintaining operational continuity. The link between EX and CX, as noted in the literature, highlights that a satisfied and empowered workforce is more likely to engage in enthusiastic and high-quality service interactions with customers (Bowen & Lawler, 2006). Thus, improving EX not only enhances CX but also serves as a risk management strategy, reducing reputational damage and financial losses stemming from poor service experiences.

Additionally, the study reveals the cyclical issues of seasonality and short-term contracts in Greek tourism, which intensify workforce instability. This cyclic nature leads to higher turnover rates and disrupts service continuity, presenting a significant operational risk for hotels. Establishing more stable employment practices—such as offering fair wages, long-term contracts, and career development opportunities—would mitigate these risks and align with effective crisis management approaches by enhancing workforce stability and readiness to manage peak demand periods. The findings suggest that fostering a positive organizational culture that values mutual respect, inter-departmental collaboration, and inclusivity can serve as an additional risk mitigation tool. A

cohesive corporate culture strengthens employee loyalty and reduces turnover, contributing to a resilient work environment that is better equipped to handle operational disruptions.

Moreover, in terms of risk management, the bidirectional relationship between EX and CX is particularly relevant. The study confirms that a positive employee experience directly impacts CX, which in turn affects customer loyalty and reputation. From a risk management perspective, this feedback loop represents an opportunity for organizations to use EX improvements as a lever to control reputational risk. Satisfied employees contribute to positive customer interactions, which enhance the sector's image, particularly in high-demand and high-competition tourist destinations. Additionally, employee training and empowerment should be integral components of a risk management framework, ensuring that staff are equipped to adapt to dynamic customer demands, even during periods of operational strain. The findings also stress the value of implementing proactive crisis management strategies, including continuity planning, to enhance sector resilience. Given the high turnover and labor shortages currently facing the sector, continuity plans that incorporate regular risk assessments and business impact analyses are critical. Such measures would enable hotels to anticipate workforce shortages and implement proactive solutions, reducing the risk of service interruptions and reputational damage.

6. Conclusion

This study's findings underscore the need for structural changes within Greece's tourism and hospitality sector, highlighting risk management as an essential tool for addressing labor shortages and maintaining service standards. By prioritizing a positive EX, addressing working conditions, and fostering a supportive organizational culture, hotels can mitigate the risks associated with employee turnover and service quality. Additionally, investing in workforce development through training and support systems empowers employees to manage customer demands effectively, reducing operational vulnerabilities and enhancing resilience.

In a broader sense, the study suggests that incorporating a comprehensive crisis management strategy—one that integrates EX improvements as part of risk management—will be key to the sector's sustainability. Engaging stakeholders across government, industry, and education can further support collaborative solutions to the workforce challenges identified in this study, promoting a resilient tourism ecosystem in Greece. Future research might explore quantitative assessments of EX and CX in other tourism regions, contributing further comparative insights into effective crisis management practices within the global hospitality industry. These findings collectively advocate for a proactive, employee-centered risk management approach as a means of sustaining service quality and strengthening Greece's tourism reputation in a competitive international market.

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Appendix

Appendix 1. In-depth interviews questionnaire

In-depth interviews with experts in hotel industry in Greece

1. Do you believe that Employee Experience (EX) affects Customer Experience (CX) and vice versa?
2. When is this relationship strong? (Referring to contributing factors)
3. Can you identify factors of Employee Experience (EX) that affect Customer Experience (CX) (EX -> CX) and factors of Customer Experience (CX) that affect Employee Experience (EX) (CX -> EX)?
4. If we consider that employee satisfaction is a factor in customer experience (from the previous question), does employee satisfaction affect customer satisfaction?
5. What do you consider to be the contributing factors in shaping the customer experience?
6. Is customer engagement a contributing factor to customers' experience, or is it a result of the experience they are having?
7. Results of customer experience are considered to be loyalty, satisfaction, engagement, intention to revisit, repurchase, word-of-mouth (WOM), intention to co-create, and customer citizenship behavior intention. Which of these do you focus on? How do you measure them?
8. How important is the customer-employee interaction in shaping customer experience and customer loyalty? Do you recognize the contribution of servicescape and experiencescape in shaping customer experience?
9. How much do demographic characteristics affect the customer experience?
10. How much do demographic characteristics affect the employee experience?
11. What are the contributing factors of employee experience?
12. How do you measure employee experience?

Appendix 2. Focus group discussion guide

Focus group questionnaire

1. It is mentioned in the press that since the spring of 2024 there are 80,000 job vacancies in the industry. What is your opinion on this? What could be the cause of this?
2. What factors do you consider that contribute to employee satisfaction that would lead to employees' retention in a hotel?"
3. Have you resigned from/ left other hotels in the past? Would you like to mention the reasons?
4. Can you describe a negative experience and a positive experience you have had as an employee in the tourism industry?
5. How does a positive/negative Employee Experience (EX) affect Customer Experience (CX)?
6. How does a positive/negative Customer Experience (CX) affect Employee Experience (EX)?
7. Describe a customer's behavior with positive/negative Customer Experience (CX) and how you handle them.

***Journalism in Turbulent Times:
The Role of the Media During Crises***

Local Media, Local Disaster in a Post-covid Era

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Abstract. Community journalism and neighbourhood journalism involves searching for and identifying the distinguishing features of this type of press. It creates an 'intimate' space for shared knowledge with its audience, which is particularly evident when the community is overwhelmed by an emergency. In emergencies, the role of new information technologies, when used strategically and in a participatory manner, falls to journalists, whether from the community or institutions, who favour forms of communication, cooperation and immediate intervention. The article reports on a local case study of journalistic practices and how local journalists operate in communities affected by natural disasters. One of the most interesting results concerns the sense of belonging to a community, which is typical of citizen journalists and leads them to explore the hardships and difficulties of their territory in depth. This sometimes goes beyond the specific logic of modern media ecology and involves experimenting with languages and giving voice to colleagues, as well as to 'old and new' audiences, including those located outside the community. In the specific case reported, this also involves giving voice to the victims of the disaster themselves.

Keywords: natural disaster; community media; journalism; floods; Italy

1. Introduction

According to Radcliffe and Wallace (2021), the COVID-19 pandemic, the largest public health emergency in recent years, threatened to 'wipe out' many newsrooms around the world. The main effort to produce emergency information is focused on local journalism, a publishing sector that is even more in crisis after the pandemic event. Local media have a smaller pool of audiences to draw from and are the ones most affected by the crisis.

In global emergencies, without long-term economic support, the losses suffered by community media could have a profoundly negative impact on the information of (and for) the community (Comunello, Mulargia 2018). Without a vibrant information industry, there is a risk that public institutions will be less responsible and transparent in the exercise of their functions than in a stable social situation (Lombardi 2006; De Vincentiis 2018).

Moreover, during an emergency, whether geographically limited or extensive, there is hardly ever a general narrative of events. Instead, there is a myriad of narratives that must be contextualised and explained to different communities (Radcliffe, Wallace 2021).

And it is precisely in these situations of social and informational disorder that the centrality of local journalism reveals itself, as news agencies alone cannot do all the work of ‘shaping’ the news and intervening to verify its veracity, as they cannot put an article online and at the same time work with the print media in the newsroom.

The effort must be joined at local and national level, integrating editorial and online work, with observation in the field, in contact with the various communities of reference that can explain what is happening, thus integrating the journalist's point of view. The aim is not only to investigate the consequences of a disaster or to record its damage, but to collect and report on people's states of mind, to loosen a certain critical gaze on reality that journalism should account for daily (Da Lago, De Biasi 2006).

The contribution presented here attempts to build on Radcliffe and Wallace's considerations, going beyond, however, the reflection on the relationship between local media and the Covid-19 pandemic, focusing instead on a new recent emergency, much more ‘local’ than the previous ones: the flood that hit Romagna starting on 15 May 2023.

An emergency that soon became a national story, born, however, within the local editorial offices of Romagna, some of which were almost submerged by water within hours of the start of the violent rains, which saw editors and chief editors quickly move from their desks to the office, work in the field, use every possible means, traditional or digital, just to record the live emergency of the flood and respond to the desperate requests of citizens on the phone from the editorial offices or to their comments via social media.

Reporting from the territory means constructing a reasoned point of view and not mere exposition of facts. The local newspaper does not only collect news, but becomes a place of active, aggregating intermediation (Russ-Mohl 2011).

Information that speaks of and in the community, in fact, must seek to understand the plurality of components of which the social environment is made up, to allow the definition of interpretative outlooks through which to understand the world. And local information is that cultural expedient that provides the opportunity to recognise itself, becoming a meeting place (Kapferer 2012).

The activity of a local newspaper is very much influenced by where it is located, it is important to understand whether there are more factories or more fields to cultivate, what work the inhabitants of the area do, what interests they have. The lay of the land itself can make a huge difference.

The current challenge of community journalism is to be able to fulfil an important civic, political and service function even while remaining faithful to its own mission, trying not to be completely overwhelmed by the processes of digitisation and platforming of media content, especially emotional content.

2. Methodological notes

According to the Istituto Superiore per la Protezione e la Ricerca Ambientale in Italy (2023), the territory of Romagna, the subject of our study, was affected by two events in sequence in just a few days in May 2023 alone, with cumulative monthly rainfall exceeding 450 millimetres in various locations. The current event from midnight on 15 May to 17 May caused the overflowing of 21 rivers and widespread flooding in 37 municipalities. In the following hours, peaks of 300 mm were recorded on the ridge and hill basins of the Forlì area (Romagna).

Socio-natural disasters of this type are by definition extra-ordinary events, concentrated in time and space, which cause an interruption of daily routine (Quarantelli 2000) and destabilise the social structure, producing disorder, human losses and destruction (Gilbert 1998). Increasingly, these are sudden and often unpredictable events that interfere with company equilibriums, leading to situations of collective stress that transform the biological system, the political system and the cultural system, and change the motivations of the actors within these systems.

In the light of these considerations, this contribution analyses the behaviour of local media in emergency contexts.

Specifically, taking the recent flooding that hit Romagna in May 2023 as a reference, an attempt was made to understand how journalists operated within the affected community and organised their work in the formation of information, inside and outside the editorial offices, how and if their routines changed and which channels they used most.

Four main research questions: how would one define local journalism today and how does it function in the analysed social context? What kind of content is generally on the media agenda and how does this change in the emergency? How is local editorial work organised and how has it changed in the aftermath of the flood? How are newspapers in Romagna Yes linked to the community and local institutions?

In order to answer these questions and best represent the theme analysed, a qualitative methodology was used, that of the semi-structured interview. Sixteen interviews were conducted, between the end of June and September 2023, including in the sample journalists (professional and non-professional), with different roles within the local editorial offices, present in the four main cities of Romagna affected by the flood: Rimini, Cesena, Forlì, Faenza (with reference also to the Municipality of Ravenna).

Given the exploratory nature of the research, the qualitative approach chosen allowed to focus more on the depth of the information collected and to gather in I detail the reasons of the interviewees, through their own words.

The semi-structured interview therefore seemed to be the more appropriate technique in terms of openness and flexibility, allowing the freedom - where necessary - to broaden the questions and ask for further clarification. The interviews lasted between forty-five and sixty minutes and were

conducted by appointment with the journalists, both in person and online (via the Teams platform, in the case of newsrooms located in the flood-affected areas and only partially accessible then).

The content of the interview was videotaped and then transcribed in full (Bloor et al. 2001). The textual corpus resulting from the interviews was treated following a procedure of type inductive face to identify, on the basis of the interview track, categories themes more relevant and significant (Ryan, Bernard, 2003) to describe the perceptions, opinions and behaviours of journalists during the emergency flood.

The interview extracts were then reorganised according to these categories. Specifically, two main dimensions of analysis were identified, relating to the local journalistic field and to the profession of journalism in emergencies:

-socio-biographical. This first dimension concerned, on the one hand, the professional life of the journalists involved in the research, inside and outside the newsroom, inside the community affected by the flood, as well as their own idea/perception of local journalism (in an emergency); on the other hand, the political editorials of the individual dailies and the use of certain channels and technologies;

- organisational-cooperative. In this case, it was wanted to explore the role of the local journalist and the internal production routines of individual newsrooms in terms of their collation territorial and the availability of resources human and technological. We have concentrated on those that McQuail (2001) defines "organizational" and "ideological" influences, where the former concern especially the bureaucratic routines, while the latter are the values and conditioning that I am not only individual and personal, but that are also born from the context social (and technological) and influence the activity information.

3. Results

3.1 Live and tell journalistically the Romagna

The local news, which once marked a clear dichotomy between the story of the deviance, of the subversion of the order, carried out through the news black and the story of the institutional life that regulated the civil coexistence of the social partners, was probably also the first place of information journalism to open more so to the variety of the system social, to represent previously unknown realities.

Aiming on the specifications peculiarities, local newspapers I am you succeeded to expand the news field, following also from the speed up informative, managing to satisfy better that wide range of actions, subjects social, opportunities that are composed everything is fine local reality. As they say some of the respondents involved in the study:

I have been working here for a long time. Before I was in Rimini, now in the Cesena newsroom. I have known and told about two different types of communities (..) over time I have used Everything is fine type of technology applied to journalism. The journalistic practices are very

similar at local and national level. Today with digital, actions and functions, are more or less the same, but local journalism still exists, it has not yet been totally absorbed by the logics of the network and the platforms (I, 4)

First of all, I don't think. is possible to talk about a real model of local journalism in Italy. I don't think there is one, not even from Romagna, I've learnt by watching and doing (...) Each local newspaper has its own peculiarities, its own history, its own objectives, its own "sensibility". What It is known that in the last years, following from the recent crisis, local information has strengthened the bond with the community, on this there is no doubt (...) What distinguishes us from Repubblica, Sky and "all that world there" are the themes and the possibility / ability to go in depth on that is That it happens close to us, that that we same we live. It's an ability and a privilege that the colleagues that they work at the national level they don't have" (I, 10)

Our work has certainly changed over the years. But the perception that we we have is to be another reference for the community (...) Unlike the daily newspapers national, we have a lot of autonomy in the choice of the news (...) We are first of all "the territory", a "connector informative" between editorial and single city. Also from the point of view of history... how shall I put it... a "grammar" has developed over time that is typical of local information in Romagna" (I, 11).

Information therefore has the exclusive on much information from the territory, especially in cases of serious emergency, where it takes on great importance relevance news value from the territoriality. The more limited the context of dissemination of the newspaper, the more relevant it is how much it happens in this context (Tierney et al., 2006).

In the case of natural disasters such as earthquakes or floods, the "proximity" factor is fundamental. The interest is due to the opportunity to get to know the people first hand, the actors and the places protagonists of the facts; this allows at the community of knowing live information utility and to have a " competence communicative ", that is to ascertain the plausibility of what is told, then the reliability of the medium As mentioned in part, the evolution technology has also allowed to local information to shorten incredibly the times of realisation of all the products. With digital, even if with some difficulties of adaptation and an initial attitude of contempt in the comparisons of online news, the Italian journalism had to take act of the fact that to make survive that consolidated way of providing information on printed paper, it was necessary necessarily to hybridize it with the new ones needs in the new environments informative (Splendore 2017).

As highlighted by Ryfe (2012) and some of the journalists involved in the research, who work both in the daily newspaper and online, many newsrooms are still struggling to adapt to the changes. The fundamental challenge that digital has imposed on traditional journalism is not only about the income and job stability of the information operator, but rather concerns the profession, policy, editorial and technological medium (Singer 2003; Chalaby 2016;).

The paper still preserves its " institutional " value (...) there are no doubts about the costs, yes, we can discuss of the sales in constant descent, but the newspaper that it comes out the next day and is the root of an old way of working that still really inform (...). Writing and consuming online news is today a reality also specific to local journalism, but someone still preserves, in part, the

old way of doing journalism, going out daily with the classic newspaper paper, and to the same time that yes, we update our users through our online pages (I, 15)

Some colleagues they still work on this double track " paper " and " online ". It's also a question of politics, editorial, media, history and culture, local staff and journalism (I, 17)

The paper still preserves its " institutional " value (...) there are no doubts about the costs, yes, we can discuss of the sales in constant descent, but the newspaper that it comes out the next day and is the root of an old way of working that still really inform (...). Writing and consuming online news is today a reality also specific to local journalism, but someone still preserves, in part, the old way of doing journalism, going out daily with the classic newspaper paper, and to the same time that yes, we update our users through our online pages (I, 15)

In this way we maintain the trust of our readers. Then we also work online (...) Maybe we resume the story already published, we insert some detail, but yes, it is always and in any case about flash news (...) But sometimes it is no use not to recognise it, working on the online allows you to publish something new and special that is not already state press release elsewhere, and therefore, even if fragmented, you can to intrigue the users, to attract attention (I, 6).

3.2 Telling the crisis from the inside

The environmental disaster that hit Romagna concerned a series of events alluvial and geological products of a front meteorological event of Atlantic origin, in turn fuelled by a cyclone Mediterranean, which has generated persistent rains, floods, overflows and landslides on a large part of the region (ISPRA 2023).

As early as 14 May 2023, the service of the Regional Agency for Environmental Protection of Emilia-Romagna issued the alert orange and yellow for criticality hydrogeological in the provinces of Ravenna, Forli-Cesena and Rimini and the areas of Bologna and Ravenna:

As they recall the interviewees :

Already from that date, even working exclusively online, we decided to concentrate the last hours of the day of the press release that they were about the meteorological situation of our region (...) The previous ones rains of 3 and 4 May they had provoked numerous damages in the province of Ravenna and had forced many people to evacuate (...) This time there was greater tension and anxiety among the citizens that they continuously commented online and asked important details (I, 5).

This time there was greater tension and anxiety between the citizens that they were constantly commenting online and asking for important details (I, 5) With the first flooding the communication emergency, and then even the news, are increased in a frightening way (...) by the citizens, the authorities, the mayors (...) So we started to collect and select that is that it seemed to us more urgent and that could help the citizens to understand how to behave (...) Since that night our work has been about the flood, it did not exist any more nothing (I, 11).

Journalism filters everything that happens, allowing its own public to orient itself between the events and to acquire information to spend daily. And this task it comes exercised through an elaborate process of attribution of relevance, which is used to choose that what it is newsworthy or not (Agostini 2012).

But in the case of emergency, the need to tidy up the information increases in order to enable the inhabitants of the affected areas to better track it. Information and news transmission about the event natural violent is not a "simple reproduction", rather a representation with codes linguistic - narrative precise that meets the expectations of the public, which in turn expresses the need for a key event interpretation extraordinary that he would not be able to give himself reason (De Vincentiis 2018).

According to Lombardi (2006) when yes they verify disasters unexpected contemporary media they have, on the one hand, the function important to update in real time through the channels digital the population; on the other hand, the possibility of extending the narrative communicating the data or the details of the event through the means traditional. This balance has to do with the right choice of means to be used during the " life cycle " of the disaster: the selection and verification of the news becomes increasingly difficult in the early stages of the emergency and the risk is that of oscillating between information overdose collapses and moments of information blackout.

For a local newspaper to manage all this becomes a task complex considering often the numbers rather bass of operators that they make up a local newsroom and the availability of communication tools useful to the desk activity or to be used on the place interested by the emergency. In the case of Romagna, the editorial staff, in addition to knowing these well problems, yes I found myself working in almost completely unattended workstations flooded, with the lines telephone out service and Internet network not working, in some cases for over an hour.

The inconvenience, therefore, I am multiplied in the hours following the flood:

There are six of us in the newsroom (...) usually two reach the place interested, the others they work from here (newsroom) (...) But those days between the blackouts, the water that he entered, the connection that he jumped, he concentrated on What writing and how to give the news was rather tiring, maybe more than the period pandemic (1.3)

That day in the newsroom there were three of us ... we we did everything we could, we felt on me a lot of responsibility. In the first three days we were, on the one hand, the voice of the citizens asking for help and, on the other hand, the only possible bridge of contact between those families who were far away, who had only friends or relatives in the street for days, with their cellars completely flooded (I, 7).

Often, as the interviewees pointed out, the news took on a format that was not very precise, very fast and not very well edited, where the title was simply followed by photos or video news, live, sometimes with almost no text. When it stopped raining, the use of means such as drones has proved to be strategic, as the photograph of the disaster from above "has allowed us to communicate the real situation, to identify the most affected areas hit, to contain someone information partial and imprecise that began to circulate online or in news nationals" (I, 6).

Despite the newsrooms' need to always have their "own news package" (Couldry 2015) and a good connection to work, often standing or on the move, outside or inside the newsroom, the presence of water and mud on the road caused numerous and long power and telephone cuts. This condition,

where possible, pushed the journalists to take advantage of the context in which they found to collect as much information as possible and to select the contents shared to come to readers.

The numerous inconveniences, also in the access to electronic and digital media, by the citizens, led the latter to acquire more copies paper in the following days, which became for some hours the only reference medium able to photograph the emergency in Romagna:

At a certain point, not being able to say we are all here, we concentrated on the neighbourhoods (...) Through the so-called "direct textual", or more simply with videos and photos, every day we concentrated on the history and the situation of the individual places of the city. While some of our colleagues in the Rome or Milan offices only published bulletins or reported on the destruction, the daily confrontation with the farmers, the entrepreneurs working in the most sensitive areas, allowed us to better understand the extent of the disaster and the discomfort of the community. Much of the material we then published it in the edition paper of the next day (...) In the emergency, due to the lack of electricity and connection, people have preferred to acquire the edition traditional, even if partially updated, rather than not know nothing or receive snippets of news here and there (I, 15).

For almost five days, all our efforts have been concentrated on the flood. The case Romagnolo has become national (...) In some of the nights that I am I stayed in the newsroom and received contacts from SkyTg that he asked me details on the construction of this or that dam, looking at all the costs of those responsible or to frame someone (...) Or other colleagues they wanted the number of family members of the victims (still between the others do not determine). In a situation like this, outside control, we have preferred sometimes to partially photograph the disaster and give more voice to the citizens (...) Shooting random death numbers or create further anxieties and fears, it is not a sign of responsible journalism (...) We 've already seen something similar with Covid. And we felt a great responsibility at the time (I, 3).

The literature proves that in the face of uncertainty, people turn to the media and the Internet not only to share information, but also to publicly process the disaster experience, to externalise their own emotions, to trace possible missing persons, to re-establish contact with friends and relatives, to support rescue and management activities from resources (Taylor et al. 2012). As underlined by Fraustino et al. (2017) and Farinosi (2020), the reasons that drive users to use (social) media are diverse and numerous. The latter they can be attributed partly to the needs tied to the ball informative (search for timely and unfiltered news) and partly to the needs tied to the ball relational (communication with friends and family, search for emotional support).

In the emergency, the routinization of journalistic work it is done more complex also because of the intense communication between journalists and the public. In fact, at times it seems to renew itself almost completely.

From the words of the journalists interviewed, we are witnessing a work of selection, hierarchisation and presentation of the news rather accelerated. Internal and external communication within the newsroom, between those who work at the desk and those who work in the field, is intensifying in order to ensure greater and better coordination and the involvement of the inhabitants.

From the 16th to the 17th of May, the story has widened.

To the communications institutional-emergency, that however they could not help but be reported, it was given to begin to pay more attention to the stories of the people, their voices and the great solidarity demonstrated right from the beginning coming on young coming from the community of the Municipalities struck and of the Regions neighbouring.

A choice of field that it seems good yes to approach the thought of Pierre Bayard (2022) to whom he states that it is precisely because of the increase of information false and thesis harmful in the journalism, every writer and communicator should try with his work to alleviate the suffering human, since the individual, even more than its language, is "a being of the story".

Stories, for the philosopher French, would help to make the world less hostile and to satisfy a need common to all human beings, that of creating and listening to personal stories:

In addition to data and recommendations, the presence of news stories emotionally involved the whole community, raising awareness on the issue, avoiding partisan politics (...) We gave voice, for example, to the entrepreneurs of Faenza, to the inhabitants of the city of Conselice, in short, to the cases that were more dramatic, but where at the same time there was more hope to start living again. Pluralism is also informative, the story of the others in our newspaper (I, 12).

We have collected the testimonies of more than ten young volunteers and shared probably a hundred photos in those days (...) stories and gestures of people brave and full of hope, in the midst of the mud (...) give space to everything, I think this was important for them and for us (...) it is a kind of local information that conveys hope and strength (I, 3).

A journalism, that of Romagna, that during the emergency seems to have taken on the appearance of a (local) advocacy journalism, a form of (local) journalism in which there is a fear of the need to side with the weakest or least protected in order to be the bearer of one's own interests. Information that aims to represent the positions and conditions of disadvantaged citizens or those in critical situations.

Towards the end of the week of the 15th of May, the political debate begins.

Once the rains have stopped and the damage has been assessed, numerous visits are made by national and European politicians to the main affected areas. In these circumstances, the institutional presence means that local information, in this case for the whole affected region, follows the institutional event and the words of the passing political actor, such as those of the Italian Prime Minister, Giorgia Meloni, who visited Forlì on 25 May.

Contents in addition to the social and institutional ones already reported:

It's clear that when the Italian Prime Minister, Giorgia Meloni, arrives, the coverage of this event is total (...) Many have commented on the social pages of the newspaper that we had already forgotten the victims, or that we were servants of the government just for having given space to the President. But that's not the point. This kind of presence and information policy, which was

strictly bound to the event, opened the post-emergency phase (...) and the citizens, above all the residents, have understood it. We have registered important sales and numerous views even in those days (...) beyond the economy, the citizens were interested in reconstructing the history of the flood and discovering the next steps (I, 20).

4. Conclusion

From the above, the function of social and sometimes institutional mediation, rather than mere transmission, performed by community media in emergency situations becomes clear. Local journalism, in its traditional and digital forms, becomes a central element in the construction of a territorial bond precisely in moments of uncertainty and disorientation. Newsworthiness is constituted by more intense forms of negotiation with the public of readers, often known and "loyal". Accustomed to increasingly disorganised and spectacularised information, local information ends up configuring itself as the best expression of the role of hinge between the public sphere and everyday life, a place of "meaning" and relationship, of more open listening than entertainment. Given the high level of public attention (some of it international) that the flood disaster received from Italian and European institutions, as well as its presence as a news item on all the front pages of newspapers and in local and national news bulletins, one could venture to define the event in Romagna as a media event (Dayan, Katz 1992), a narrative form (or script) based on the predetermined disruption of content programming in order to reach a large audience and to report on events at the "heart" of society.

In the case study discussed, this expression is used again helps to underline, as already supported by the two sociologists Americans, a thesis that yes he believes is still rather current, that is, as an adequate consideration of the events media and how they work allow us to see how "solidarity mechanics", considered in decline terminal in the great modern society of Durkheim, can renew itself when a medium collects whole communities and nations in an experience shared viewing (Couldry 2015).

To this Yes adds, compared to what emerged from the interviews, how local journalism in Romagna, resisting journalistic "temptations" national to organize live from the real "marathons" of the disasters (Liebes 1998), have certainly opted for a continuous live coverage, but focusing the attention on the stories and the needs of the displaced, rather than on the destruction provoked by the rains, with the risk of trivializing the events and fragmenting the participating audiences. A "methodology" that seems to recall the neo-Durkheimian idea that media events serve to integrate communities and strengthen the values of the democratic consensus.

To do local journalism, and to be journalists premises, means to search for and find a characterising element that distinguishes this type of print capable of creating an "intimate" place of knowledge shared with your audience and this condition is very evident. when the community is overwhelmed by the emergency.

The role of new information technologies, used in a strategic and participatory way in emergencies, falls to journalists as well as to those who come from communities or institutions, privileging forms of communication, cooperation and immediate intervention.

At the same time, the consideration of the "local" in the press and the relevance of the press in the local are conditions that are intertwined and mutually supportive.

In times of emergency, what Meyrowitz (1993) defined as a "public and mediated social conscience" is strengthened, in parallel with the emergence of new communication and information processes, where issues that were previously only territorially relevant now become national issues, forcing the "new public" to take a stand. "Plural and alternative voices" that directly address the specific interests of a community and constitute the corpus of news (Baker 2023). The sense of belonging to a community, typical of the citizen journalist, leads him or her to explore in depth the hardships and difficulties of his or her territory, sometimes going beyond the specific logic of the modern media ecology, experimenting with languages, giving voice to colleagues and audiences "old and new", positioned even outside this community or, as in the specific case reported, to the same victims (primary or secondary) of the natural disaster.

The bureaucratic organisation of the world by journalists, the constant oscillation between fiction and reality, the non-substantial nature of information have favoured the transition from the information age to that of "post-journalism".

A transition that does not yet seem to have completely overwhelmed the dimension of local journalism.

Crises and events happen globally, but the relationships and identities formed on the basis of shared interests, lifestyles and political beliefs, shared across geographical boundaries, "constitute the infrastructure that supports the world and makes it liveable, manageable, explorable and, more importantly, reducible to the contingencies and uncertainties that characterise everyday community life" (Silverstone 2002, p. 16).

Information technology acts as a 'bridge to the world', defining a new cultural framework in which images, narratives, chats, homepages encourage the crossing of traditional boundaries, contribute to the creation of creative exchanges between sameness and difference, heroes and anti-heroes, friends and strangers, and participate in events and circumstances in distant and remote places within media spaces that become part of society and our local life experience. Community media can support the production of local culture and heritage, as well as the social and political participation of individual communities, in their own language and on their own terms, globally. Community media provide access not only to the public sphere but also to local community life, producing and sustaining greater 'local-intercultural sensitivity' (Hamilton, 2002).

For this reason, unlike national media, and precisely because of their technical and organisational limitations, they should be seen as tools that allow communities to tell their own stories and build their own identities by discussing political, economic and cultural issues relevant to their daily lives.

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Media Coverage of Disasters and Young Audiences: A Media and News Literacy Perspective

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Abstract: In the digital age, youth are increasingly exposed to disaster-related media content through social platforms that function as both social arenas and primary news sources. This paper explores how disaster reporting impacts children and teenagers as a neglected audience group, emphasizing issues of misinformation, emotional regulation, language sensitivity, and developmental appropriateness. Drawing from communication theory, media studies, and developmental psychology, the study highlights the need for age-appropriate, emotionally supportive, and ethically responsible media practices. It also outlines educational, and policy recommendations aimed at fostering media literacy and civic resilience in young audiences.

Keywords: media consumption habits, news literacy, adjusted media use, disaster coverage

1. Introduction

In the digital age, young audiences are continuously exposed to a stream of distressing news, including disasters, wars, and humanitarian crises, through various media formats. This exposure raises critical issues of emotional and digital well-being, as well as risk of misleading information, matched against developmental appropriateness of content. Although often categorized as 'digital natives', children and teenagers represent a neglected demographic in both media design, distribution and content, and media literacy interventions. This paper investigates how traditional and digital media portray disasters for young audiences and evaluates the psychological, civic, and social impacts through a multidisciplinary lens. By drawing from international case studies and empirical literature, it offers recommendations for media professionals, educators, and policy makers to foster informed, resilient, and ethically supported young media users.

Today's youth navigate a media-saturated environment where news about disasters, wars, and crises is pervasive, intercepting content about entertainment, gaming, commercials, influencers or other trivial posts in their social media feed. Platforms like TikTok, Instagram, and YouTube have

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become major entry points for information about national and international affairs, circulating based on criteria like virality and, certainly, not social significance. However, the unfiltered, sensational, and emotionally intense nature of disaster coverage in particular, presents serious cognitive and psychological challenges for young viewers. Children and adolescents are among the most neglected audiences when it comes to content design and distribution and their developmental needs are rarely accounted for in mainstream reporting.

The media landscape today is characterized by immediacy, interactivity, and emotional intensity. Disasters, both natural and human-made, dominate news cycles, looking for clicks by capitalizing on the public's fear and anger, and young audiences are often inadvertently exposed to such content through social media, YouTube, streaming platforms, and digital news apps, always in 'adult' language. However, the ways these messages are interpreted by youth remain understudied. Mainstream media rarely considers children's and teens' cognitive and emotional developmental stages, nor does it tailor content to match their media consumption habits.

This disconnect has serious implications: not only are young people exposed to distressing or misleading content, but they are also left unsupported in processing it. According to Vraga and Tully (2021), although many young people display baseline media literacy skills, namely, the interpretive, evaluative, and communicative skills necessary to engage critically with media, their application is inconsistent, especially under emotional stress. As social media is their news space and main delivery channel, the reliance on algorithmically curated content means that youth are often exposed to fragmented and emotionally charged news without interpretative frameworks. Platforms reward virality and emotional engagement over accuracy, exacerbating confusion and anxiety (Edgerly & Vraga, 2020).

At the same time, social media play a crucial role in shaping teenagers' identities, worldviews, and civic behaviors. They act as a digital environment where adolescents explore self-expression, adopt social norms, and engage with political and cultural issues. Through continuous interaction and content consumption, teenagers form opinions, values, and a sense of belonging that significantly influence their personal development (Livingstone et al., 2011).

However, their representation in the media is minimal (if any), and young audiences are frequently absent from news narratives or portrayed only as passive and vulnerable victims, for example, in the context of cyber bullying or screen addiction warnings. Livingstone et al. (2023) argue that such representation limits youth agency and excludes their perspectives from public discourse. This underrepresentation renders youth into a marginalized audience, driving many toward alternative, often unregulated sources, like popular social media platforms, where misinformation and emotional manipulation proliferate.

2. Disaster coverage and news literacy

Disaster reporting commonly employs moral evaluations, vivid imagery, and dramatized storytelling (Vasterman et al., 2005). While these tactics may attract attention, they can overwhelm

young audiences. Without contextualization or age-appropriate framing and linguistic scaffold, such coverage can skew perception and heighten emotional distress. Exposure to disaster media can have psychological and developmental impact and even lead to secondary traumatization in affected youth, who may express symptoms including anxiety, behavioural changes, and cognitive disruptions (Benoit et al., 2022).

Media literacy as a fully-fledged set of abilities to access, analyze, evaluate, create, and act using all forms of communication, is required in all cases of information; even more in the case of disturbing news. While youth may demonstrate digital fluency, studies reveal they often lack deeper critical engagement, especially when dealing with emotionally charged content. Pfaff-Rüdiger and Riesmeyer (2016) highlight that media literacy must be socially contextualized—in other words, it should not be taught or understood in isolation, but rather within the social environments where media is consumed and shared. This involves considering the influence of peers, family, and cultural norms, as well as the specific digital platforms young people use. Media & news literacy education should address how social interactions and digital habits shape the way individuals interpret, produce, and respond to media content. By acknowledging these social dynamics, media literacy becomes more relevant and effective, empowering users to navigate the media landscape critically and responsibly in real-life contexts.

Young people are not passive media consumers; they actively engage with content, interpret it through their social and cultural lenses, and co-construct meanings in digital environments (Jenkins, 2009). However, the absence of youth-specific media literacy tools renders them especially vulnerable during crises. For example, there is good evidence establishing a relationship between disaster viewing and various psychological outcomes, especially PTSD caseness and PTS (Pfefferbaum et al, 2019). Without appropriate guidance, adolescents may struggle to critically assess misinformation or emotionally distressing content, which can lead to confusion, fear, and psychological strain. This is particularly evident during events like the COVID-19 pandemic, where youth were inundated with conflicting information and emotionally charged narratives (Ophir et al., 2021). Studies emphasize the importance of tailoring media literacy education to the developmental needs and media habits of young users, ensuring that they are equipped to navigate the digital information landscape safely and effectively (Livingstone, 2018; McDougall et al., 2018).

From a developmental point of view, younger children require reassurance and simplified news narratives, as their cognitive and emotional capacities are still developing, making them more vulnerable to confusion and fear when faced with complex or distressing information. On the other hand, adolescents, who are more capable of abstract thinking and emotional regulation, benefit from balanced perspectives that acknowledge the seriousness of events while also promoting hope and resilience. Moreover, they need opportunities for critical engagement—such as discussions, media literacy activities, or community involvement—which help them process information constructively, reduce helplessness, and foster a sense of agency in the face of crisis.

3. Adjusted media use – a theoretical background

Young people's engagement with media in general is influenced by a complex interplay of their developmental stage, the norms of digital culture, their emotional needs, and the broader social context in which they live. Adolescents, for example, are at a stage where identity formation, peer influence, and emotional sensitivity are especially strong, making them more susceptible to both the informational and emotional tone of media content. At the same time, digital culture — characterized by fast-paced sharing, algorithm-driven feeds, and participatory norms— shapes how young users consume, interpret, and respond to disaster-related information. Emotional needs such as the desire for reassurance, belonging, or agency further influence how youth seek and engage with media during crises.

To fully understand these dynamics, it is essential to integrate frameworks from media literacy, which equips youth with critical thinking tools; risk communication, which addresses how people perceive and act on information in times of uncertainty; and youth development theory, which provides insights into cognitive, emotional, and social growth. This interdisciplinary approach helps create more responsive and effective strategies for supporting young people's media use in times of crisis by drawing from the following schools of thought:

Uses and Gratifications Theory (Blumler & Katz, 1974) emphasizes that media users are not passive recipients but active agents who selectively engage with media to fulfill particular psychological and social needs. These needs typically include seeking information, reinforcing personal identity, facilitating social interaction, and attaining emotional comfort or diversion. In the context of disasters, this theory is particularly relevant to understanding young audiences, who often use media not only to gather facts and updates but also to navigate the emotional turbulence that crises provoke. For example, adolescents may follow news to feel informed, but also use social media to share their thoughts, check on friends, or find solidarity in shared experiences. The immediacy and interactivity of platforms like Instagram, TikTok, and X (formerly Twitter) allow youth to process events in real-time while receiving emotional support from peers. Thus, social media becomes a dual-purpose space: a channel for critical information and a vital emotional resource that helps youth cope with fear, uncertainty, and the need for social connection during disasters..

Social Cognitive Theory (Bandura, 2001) posits that individuals learn not only through direct experience but also by observing the behaviours, emotional responses, and consequences experienced by others. This observational learning becomes especially potent during emotionally charged events, such as violence, natural disasters or humanitarian crises, where the emotional salience heightens attention, retention, and the likelihood of imitation. For young people, whose cognitive and emotional regulation skills are still developing, repeated exposure to graphic and distressing media content can result in vicarious trauma. Studies such as Houston et al. (2008) have shown that adolescents who consume high volumes of disaster-related media may exhibit symptoms of anxiety, fear, sleep disturbances, or even post-traumatic stress — despite not being directly affected by the event. The digital nature of modern media, where images and stories are

amplified and circulated rapidly, intensifies this risk by making disturbing content more accessible and difficult to avoid.

However, Social Cognitive Theory also offers a more hopeful perspective: media can serve as a powerful tool for promoting positive, prosocial behavioral models among youth, depending on the content it showcases. When young audiences are exposed to media narratives that highlight empathy, resilience, solidarity, or community action —such as stories of people helping others, organizing relief efforts, or standing up for vulnerable groups— they are more likely to internalize and imitate those values and behaviours. Empowering narratives that frame youth themselves as capable agents of change can foster a sense of efficacy and inspire actions like volunteering, advocacy, or peer support. In this way, media becomes not only a site of potential harm but also a meaningful space for social and emotional learning — provided that the narratives modelled are constructive, balanced, and developmentally appropriate.

Developmental Media Psychology: Children and adolescents differ markedly in how they process media, largely due to their developmental stage. Younger children, typically in the preoperational and early concrete operational stages of cognitive development, tend to interpret media content in concrete and literal ways. Their limited capacity for abstract reasoning makes it difficult for them to distinguish between real and fictional elements, particularly in emotionally charged or visually intense content. As a result, they may perceive dramatized or exaggerated disaster portrayals as actual, ongoing threats, which can heighten fear, confusion, and anxiety. Because they rely heavily on visual cues and have limited experience in critically evaluating information, the design of media for young children must use clear, calming visuals and simplified language. It should also avoid sensationalism, as intense imagery and dramatic narratives can be particularly overwhelming for this age group.

Adolescents, on the other hand, possess more advanced cognitive abilities, such as hypothetical thinking, perspective-taking, and media scepticism. However, their increased emotional reactivity —linked to ongoing neurological and hormonal development— makes them particularly sensitive to fear-inducing or emotionally provocative content. Additionally, adolescents are highly attuned to peer norms and validation, which amplifies the role of social media in shaping their perceptions and reactions. Peer-shared content, trends, and online discussions may either inform or mislead them, depending on the accuracy and tone of the material. Therefore, media targeting adolescent audiences must strike a balance: it should provide nuanced, fact-based information while also fostering emotional resilience and opportunities for critical engagement. Understanding these cognitive and emotional differences is essential for designing developmentally appropriate media that informs without overwhelming, and empowers rather than destabilizes (Pfefferbaum et al., 2014).

Ecological Systems Theory (Bronfenbrenner, 1979) offers a comprehensive framework for understanding how media influence on young people is shaped by multiple, interacting layers of their environment. According to this theory, individuals are embedded within nested systems — ranging from immediate settings like family and school (microsystem), to broader cultural and societal contexts (macrosystem)— which collectively mediate their experiences and interpretations. When it comes to media consumption during disasters, these layers play crucial

roles in shaping how youth perceive and respond to information. Parents, caregivers, and educators, as key figures within the microsystem, serve as essential mediators who can help young people interpret complex or distressing content. By providing explanations, emotional support, and context, they reduce confusion and anxiety, helping youth to develop a more balanced and accurate understanding of crisis events.

In contrast, the absence of such scaffolding leaves young people vulnerable to misinterpretation and emotional distress. Without guidance, children and adolescents may internalize fear or misinformation, potentially leading to heightened anxiety or maladaptive coping. Moreover, the cultural norms and values embedded within the macrosystem influence how disaster-related media is framed and understood, further shaping youth responses. Effective mediation by adults not only filters media messages but also models critical thinking and emotional regulation skills (Chryssanthopoulou, 2022). This highlights the importance of involving parents and educators in media literacy efforts, particularly in crisis contexts, to foster resilience and informed engagement among youth.

News Literacy and Critical Engagement: Vraga and Tully (2021) highlight a critical challenge facing today's youth: although they are deeply immersed in digital media, their news literacy — the ability to critically verify, contextualize, and evaluate news content— is often inconsistent and underdeveloped. In the digital landscape, algorithms prioritize engagement, frequently amplifying emotionally charged or sensationalized stories that may be misleading or incomplete. This creates an environment where young people are repeatedly exposed to partial narratives that evoke strong emotions but do not necessarily provide an accurate or balanced understanding of events. Because adolescents are still developing cognitive skills related to critical thinking and media evaluation, these algorithm-driven exposures can shape their perceptions in ways that may distort reality, especially during high-stress situations such as crises or disasters. Moreover, the researchers emphasize the importance of equipping youth with practical critical tools like lateral reading — where individuals cross-check information by consulting multiple sources— and source triangulation, which involves comparing different perspectives to build a fuller picture. Without these strategies, young people are vulnerable to accepting misinformation or disinformation at face value, particularly when under emotional strain or cognitive overload. The pressure and urgency that often accompany crisis situations further impair their ability to critically assess information, increasing the risk of confusion, anxiety, or mistrust. Therefore, fostering robust news literacy skills tailored to young audiences is essential for helping them navigate digital media responsibly, make informed decisions, and maintain emotional well-being in an increasingly complex information environment.

Participatory Culture and Agency: Jenkins et al. (2009) introduced the concept of participatory culture to describe a shift in how young people interact with media. Rather than being passive consumers, youth are active creators, collaborators, and sharers of content across digital platforms. This transformation has significant implications, especially in disaster settings, where young people's agency can become a powerful force for social engagement and community support. Through social media, youth document unfolding events, share firsthand information, and mobilize resources quickly, often filling gaps left by traditional media or official channels. Their

contributions not only raise awareness but also foster solidarity, provide emotional support, and help coordinate relief efforts, demonstrating a new form of civic participation enabled by digital connectivity (Dahal et al., 2021; Yan & Pedraza-Martinez, 2019). However, this participatory role is a double-edged sword. While empowering, it can also expose young people to risks such as overexposure to traumatic content, emotional burnout, and the unintended spread of misinformation. The pressure to continuously produce and share updates during crises can be overwhelming, especially when combined with the emotional weight of witnessing suffering or loss. Furthermore, the rapid and decentralized nature of social media means that false or misleading information can quickly circulate, sometimes amplified by well-intentioned but uninformed youth contributors. This underscores the need for media literacy and emotional support strategies that help young people navigate their active roles responsibly—balancing empowerment with critical awareness and self-care in the high-stakes environment of disaster response.

The aforementioned theoretical frameworks highlight the multifaceted nature of youth-media interactions during disasters, emphasizing that these engagements are not passive but highly active and emotionally charged. Young people do not simply receive information; they interpret, question, and respond to it within a complex web of social relationships and personal experiences. Their emotional responses to disaster-related media are intensified by developmental factors, such as age-specific cognitive abilities and emotional maturity, which influence how they process and cope with distressing content. Moreover, these interactions are deeply embedded within social contexts—including family, peer groups, schools, and digital communities—that shape both the reception of media messages and the ways youth express and manage their feelings during crises.

Given this complexity, media systems and journalism practices must evolve to meet the unique needs of young audiences in disaster contexts. This involves creating age-appropriate content that acknowledges different developmental stages, using language and visuals that are clear, sensitive, and accessible to children and adolescents alike. Beyond content creation, it is essential to provide young people with practical tools for critical evaluation, such as fact-checking strategies and media literacy education tailored to their cognitive levels and social realities. Additionally, pathways for meaningful engagement should be fostered—encouraging youth to participate actively in information sharing, community support, and resilience-building activities. By integrating these approaches, media can serve not only as a source of information but also as a catalyst for empowerment, emotional healing, and social connection among young people during and after disasters.

4. Engagement with media outlets

Young people's engagement with news is complex and influenced by the interplay of various key dimensions, mostly: timing, personal characteristics, and the media platform used—often conceptualized as "the moment, the person, and the medium" (Sobowale et al., 2020). Timing refers to the specific context in which news is accessed. These "news moments" can vary: a dedicated moment involves intentional engagement, such as watching a news program or reading

an article; updated moments refer to checking headlines periodically throughout the day; time-filler moments are casual interactions with news during idle periods, like scrolling during a commute; and intercepted moments happen when news is encountered incidentally, often via social media feeds or push notifications. Each of these moments shapes how deeply youth engage with news content, how much they retain, and how they emotionally respond to it—especially in high-stakes contexts like disasters.

The second dimension—individual characteristics—further shapes how youth engage with news. Sobowale et al. (2020) identify four distinct youth news consumer profiles. Heritage News Consumers rely on traditional sources like TV or newspapers, often shaped by family habits. Dedicated News Devotees actively seek out information, are highly engaged with current events, and show a preference for in-depth, factual reporting. Passive News Absorbers, in contrast, consume news sporadically and without active effort, often through incidental exposure. Lastly, Proactive News Lovers combine curiosity with technological savvy, using digital tools to seek diverse perspectives and verify facts. These categories reflect not only differences in behaviour but also differences in media literacy, trust in news, and emotional resilience, especially when navigating crisis-related content.

The third factor—the medium or platform used—also plays a crucial role in shaping youth news consumption. Different platforms offer varying affordances that influence how news is experienced. Instagram and TikTok, for example, favor visual storytelling and quick, emotionally resonant content, which can engage younger audiences but may also oversimplify complex issues. Facebook remains a platform for shared news among older youth and family networks but is declining in popularity among younger teens. Twitter (now X) serves as a real-time news source, valued for breaking updates but also criticized for amplifying misinformation. **YouTube** serves as a hybrid platform where youth access both entertainment and news content, often through influencers or explainer videos that blend information with personal narratives. Reddit attracts users seeking niche or community-driven content, allowing for deeper discussion but sometimes lacking in content moderation. Podcasts, meanwhile, offer long-form, immersive engagement with news, which appeals to youth interested in context and analysis. Each platform's format, algorithmic structure, and social environment significantly influence not only what news youth consume, but also how they interpret and act on it.

Understanding these dimensions is essential for designing effective strategies to engage youth in informed, critical, and emotionally healthy ways. Educators, journalists, and policy-makers must acknowledge that youth news consumption is not one-size-fits-all but rather shaped by diverse habits, preferences, and developmental needs. Tailoring news delivery to suit different moments and platforms, while supporting the development of media literacy for each consumer profile, can empower young people to engage more thoughtfully with current events. This is particularly vital in crisis situations, where the accuracy, clarity, and emotional tone of news can significantly impact how youth understand the world and their role within it.

5. Media disaster narratives and youth

Research has examined how youth are represented in disaster-related news media, revealing five dominant narratives that shape public perceptions of their roles. First, youth are often portrayed as vulnerable individuals in need of protection, emphasizing their physical and emotional fragility. Second, they are depicted as passive bystanders who remain uninvolved or powerless during disaster events. Third, within adult-centered frameworks, children and adolescents are sometimes seen as dependents, requiring adult intervention and decision-making. Fourth, there is a growing recognition of youth as active agents who take initiative, assuming responsibilities traditionally associated with adults, such as organizing relief efforts or advocating for change. Finally, youth are sometimes instrumentalized as legitimizing figures, where their images or voices are used to justify particular disaster responses or policies (Al-Baldawi et al., 2021).

These reductive portrayals, especially those emphasizing vulnerability or passivity, risk obscuring the diverse realities and potential of young people in disaster contexts. While it is true that youth may require support and protection during crises, focusing solely on these aspects can inadvertently undermine their agency and resilience. Such narratives may also contribute to a one-dimensional understanding of youth that neglects their ability to adapt, contribute meaningfully, and even lead disaster preparedness and recovery initiatives. Recognizing this complexity is crucial for developing more nuanced and empowering media representations that reflect the full spectrum of youth experiences and capacities.

Moving beyond simplistic or adult-centric portrayals calls for a deliberate shift in media narratives to highlight the strengths and capabilities of young people. Media outlets and practitioners should emphasize stories of youth leadership, innovation, and community engagement, showcasing how adolescents and children can be vital contributors to disaster risk reduction and resilience-building. By doing so, media can play an important role in reshaping models of societal attitudes, encouraging policymakers and practitioners to involve youth more meaningfully in disaster planning and response. This approach not only validates young people's experiences but also fosters a more inclusive and effective disaster management framework that leverages the energy, creativity, and commitment of the next generation.

6. Recommendations for disaster media coverage to engage young audiences

In order to address and engage young people, the way the news media covers stories in general may need to change, addressing issues such as negativity, stereotypes, and diversity. Young people don't want the media to shy away from serious or difficult stories, but they would also like to see stories that can inspire them about the possibility of change and provide a path to positive action. Younger audiences will respond to news that has personal utility or helps with their development. They are also hungry for stories with a 'point of view' but they need to be informed by facts rather than prejudice or agenda

News media need to make websites and apps easier to use for younger groups – as simple and intuitive as their preferred social media. This could mean using clearer language, more interactive storytelling and better recommendations that surface interesting content for younger groups. They need to tell stories in ways that better fit the moments when young people are open to news. This means creating more formats that are native to mobile and social platforms, as well as incorporating these ideas in their own websites and apps – but without losing the trusted authority of a traditional news brand. The following recommendations may be considered:

Clear, age-appropriate and emotionally sensitive language: In crisis reporting, it's essential to use simple and clear language that avoids sensationalism. Younger children interpret news more literally and are emotionally vulnerable, while adolescents require more nuanced, yet still accessible, explanations. Emotionally neutral but informative language reduces fear and confusion while fostering comprehension.

Context and historical background to support understanding: Disasters and violent events can seem abrupt and confusing. Offering timelines, maps, or historical background helps young viewers make sense of what they see. Context reduces panic and promotes critical engagement with the underlying causes of a crisis (Korona, 2023).

Visual explainers and multimedia to deconstruct complex events: Multimedia elements such as diagrams of conflict zones, simplified animations, and graphic timelines can make chaotic events more intelligible. On platforms like YouTube or TikTok, these formats provide clarity and reduce misinterpretation while catering to youth media habits (Swart, 2021).

Source transparency and misinformation awareness: During disasters, rumors and manipulated content spread rapidly. Outlets must clearly label sources, provide direct links, and use embedded prompts to guide youth in verifying credibility. Teaching techniques like lateral reading empowers youth to detect false or exaggerated narratives (Wineburg & McGrew, 2019; Breakstone et al., 2023).

Trauma-informed design to avoid emotional overload: Graphic content, repetitive exposure to violence, or sensational headlines can traumatize young audiences. Journalists should issue content warnings, minimize gratuitous imagery, and offer positive coping narratives. This trauma-informed approach protects emotional well-being while preserving informational value (Scott et al., 2023).

Interactive opportunities for emotional processing and empowerment: Youth benefit from outlets that encourage them to reflect and act—such as comment sections, polls, or digital

storytelling. These outlets allow youth to express themselves, feel less helpless, and engage in collective meaning-making during crisis periods.

Featuring youth voices and experiences: Instead of only portraying youth as victims, highlight stories of young people who are navigating, responding to, or leading during disasters. Their testimonials can humanize complex crises, inspire peers, and show that young people are active civic participants.

Reporting adapted to platform-specific youth behaviors: Disaster coverage should be formatted according to platform-specific norms. For example, Instagram is suited for carousel explainers, TikTok for short updates, and YouTube for emotional or eyewitness storytelling. On each platform, messages must be tailored to its tone and user expectations (Swart, 2021).

News Literacy and critical thinking cues in content: Subtle in-story nudges—like “check this source” or “verify using another outlet”—can help young people build lasting critical habits. This is crucial when crises flood timelines with half-truths, memes, or propaganda (Brodsky et al., 2021).

Framing youth as agents of recovery, not just victims: In disaster narratives, youth are often shown as helpless. But media should also highlight youth organizing relief, sharing accurate information, or supporting communities. These representations foster resilience and civic identity (Al-Baldawi et al., 2021).

Training stakeholders in their communication, as research identifies an opportunity for relief organizations to improve their use of social media for disaster management. While relief organizations focus on informing disaster victims about aid distribution, most users are asking about how they as individuals can donate or volunteer. Thus, besides posting information directed to victims, organizations should post more information targeting potential donors and volunteers (Yan & Pedraza-Martinez, 2019).

These recommendations support a more ethical, effective, and empowering approach to disaster reporting for youth—respecting their vulnerabilities while amplifying their strengths.

7. Conclusion

As a general observation considering overall media coverage, it should be considered that adolescents increasingly explore identity and autonomy through both risky and creative digital activities. Future research should focus more specifically on how different technologies and digital features shape user behaviour, using an ecological approach to better understand adolescents' digital lives.

This clarity is essential for developing effective public policies — not only those involving parents, teachers, or clinicians, but also structural changes like legislation and tech design regulation. To fully grasp the impact of digital life, researchers should analyze it in three ways: as device and app usage, as engagement in digital environments, and as the underlying infrastructures transforming society (Livingstone, 2024). This can help differentiate the currently confusing mix of findings linked to diverse digital services, activities and contexts and, thereby, more precisely inform public policies. These policies should go beyond efforts that depend on parents, educators, or healthcare professionals, and include long-term structural changes through laws and regulations—such as requiring companies to enhance the design of their technologies. At the same time, schools should embed media literacy within curricula, using tools like lateral reading and scenario analysis to enhance comprehension and emotional regulation while parents, educators, and caregivers can serve as critical mediators. They can provide emotional scaffolding, encourage fact-checking, and model healthy media behaviours (Chryssanthopoulou, 2022).

Further, policies are required to recognize media literacy as a core educational competency. Curricula should be developmentally responsive, culturally inclusive, and interdisciplinary. Teachers need professional development, while platforms must be held accountable for content curation. Initiatives should also support parental engagement and peer-led education. Media literacy education fosters not only critical thinking but also emotional and civic resilience. Youth empowered with these skills can participate in democratic dialogue, engage in community actions, and navigate crisis narratives with agency. Programs must highlight solutions, community responses, and youth contributions to counterbalance despair.

Disaster coverage represents an indispensable element of contemporary media; however, its psychological and developmental ramifications for young audiences necessitate careful consideration. To attenuate potential adverse effects, it is imperative that media practitioners adopt trauma-informed, developmentally appropriate communication strategies that reflect the cognitive, emotional, and social heterogeneity of children and adolescents. This entails the deployment of clear, accessible language, comprehensive contextualization and explanation, and the utilization of multimedia formats tailored to the affordances of various digital platforms frequented by youth. Furthermore, embedding news literacy education within content and facilitating interactive engagement serve to enhance critical thinking skills and emotional processing capabilities among young consumers.

Ethical journalistic practices must also emphasize the representation of youth not merely as passive recipients of distressing information, but as active agents capable of resilience and meaningful participation in disaster risk reduction and recovery efforts. Prioritizing source transparency and combating misinformation are essential to safeguarding youth from the deleterious effects of inaccurate or manipulative content prevalent in crisis communication.

Future scholarly inquiry should systematically investigate the longitudinal effects of disaster-related media exposure on youth development, with particular attention to the efficacy of integrated, multi-modal interventions designed to bolster media literacy, psychological resilience, and civic engagement. Critically, the co-production of research and intervention strategies with youth stakeholders will enhance the relevance and impact of such efforts, fostering media

environments that are both protective and empowering. Through these concerted endeavours, media coverage of disasters can be reconceptualised as a constructive pedagogical and participatory platform, rather than a source of vulnerability.

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Harnessing Augmented Reality, Crowdsourcing, and Big Data: Enhancing Collaboration and Responsiveness in Crisis Communication

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Abstract. This paper explores the role of augmented reality (AR), crowdsourcing, and big data within journalism, emphasizing how these technological trends improve crisis prevention, preparedness, responsiveness, and recovery, by fostering collaboration and engagement among audiences, journalists, and NGOs. Through qualitative analysis of three case studies, this paper provides answers to key research questions, enhancing comprehension in the field of crisis communication and contributing to the existing body of literature. The results suggest that augmented reality, crowdsourcing and big data are pivotal for improving communication during crises situations. They also highlight their role in fostering a collaborative culture among audiences, news media, and NGOs to effectively navigate crises, such as the Russo-Ukrainian war and the Gulf Cooperation Council crisis, while facilitating a more adept response to emerging challenges, thereby enhancing overall responsiveness. Lastly, they indicate the successful application of these technological trends across various crises scenarios, including COVID-19 pandemic and Australia’s bushfires in 2019, promoting transparency and enhancing coordinated crisis resolution.

Keywords: augmented reality (AR); crowdsourcing; big data; journalist-audience collaboration; responsiveness; crisis communication

1. Introduction

In recent years, emergency situations such as the COVID-19 pandemic and natural disasters have posed significant challenges, influencing public health systems, the economy and the functioning of governmental institutions. These events exemplify the concept of a ‘crisis’ defined as the perception of an unexpected incident that threatens and impacts an organization’s performance, generating unpredictable and negative outcomes (Coombs & Holladay, 2010; Bányász, 2023). Related examples include the COVID-19 outbreak that disrupted healthcare systems and economic stability across the globe and environmental disasters that cause infrastructure breakdowns,

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affecting organizations' strategic goals in an unpredictable way (Anand et al., 2022; Haupt, 2021). In this context, 'crisis management', a process designed to prevent or lessen the damage a crisis can inflict on an organization and its stakeholders, has become a critical discipline, providing structured models that facilitate institutions to effectively respond to unexpected disruptions (Coombs, 2007; Haupt, 2021; Palen et al., 2007). Among these frameworks, the PRRR model comprises four key phases: prevention, preparedness, response and recovery. Each phase addresses a specific aspect of a crisis lifecycle, including actions that prevent and reduce the likelihood of a crisis, alongside recovery efforts that minimize the negative impact of unpredictable events. However, responding to a crisis also requires effective communication that ensures the proper design and delivery of emergency information directly to the public (Anand et al., 2022; Seeger et al., 2021).

According to Coombs (2010), crisis communication has been widely accepted as the collection, processing and dissemination of information necessary to address emergency situations (Coombs, 2010). Moreover, it includes two primary elements: 'managing information', which refers to the collection, analysis and distribution of crisis-related data that enable effective decision-making while also underline emergent challenges and threats, and 'managing meaning', which pertains to influencing public perceptions of a crisis and the organizations involved (Bowen & Zheng, 2015; Coombs, 2019; Palen, 2007). Subsequently, media organizations play a pivotal role in facilitating effective communication during crises, providing citizens with reliable and up-to-date information and legitimizing decisions taken by political leaders in response to emergency situations, while also shaping public perception of their appropriateness and broader impact (Council of Europe, 2021). In this regard, news publishers utilize digital tools and communication channels, ensuring the rapid and efficient distribution of crisis-related data to the public. For example, during the pandemic, social media was used for disseminating information and personal testimonies that covered the human side of the crisis, while the existence of visualizations into daily news improved understanding of COVID-19 (Sheng et al., 2021).

However, the ever-evolving technological landscape is driving transformations in the field of crisis communication and media coverage of emergency situations due to the rise of technological trends like augmented reality (AR), crowdsourcing, and big data (Nielsen et al., 2023). Although previous studies (Aldin Alhaffar et al., 2023; Ardito et al., 2021; Bag et al., 2023; Fromm et al., 2023; Sheng et al., 2021; Vermicelli et al., 2020; Yoo et al., 2023) have highlighted the importance of technological innovations in enhancing crisis communication, especially during the pandemic, there is a need to further examine how augmented reality, crowdsourcing and big data reshape journalistic coverage during emergencies (Chen & Zhang, 2024; Jin & van der Meer, 2025; Vermicelli et al., 2023), developing a collaborative relationship among news media and the public.

For these reasons, this study examines the role of augmented reality, crowdsourcing, and big data within journalism, focusing on how these technological trends strengthen collaboration and engagement among media outlets, non-governmental organizations (NGOs) and the public, ultimately contributing to more effective communication and coordinated responses to unpredictable events. To achieve its purpose, this study presents a comprehensive literature review regarding the use of these technologies by media organizations in emergency situations and analyzes three case studies involving their application in responding to crises that currently affect Europe, providing answers to key research questions. Consequently, through the presentation of

coherent and evidence-based findings, it expands and contributes to the existing body of knowledge on the application of these technological trends in the field of crisis communication.

2 Theoretical Background

2.1. Technological trends in the field of crisis communication

Given the constantly changing technological landscape and global risk uncertainties, the role of technological solutions during crises has become quite important (Ardito et al., 2021; Bag et al., 2023; Nielsen et al., 2023). In this context, emerging trends such as augmented reality (AR), crowdsourcing and big data have gained prominence in the field of crisis communication (Bányász, 2023; Vermicelli et al., 2020; Yoo et al., 2023). Analytically, ‘augmented reality’, an emerging technology that can superimpose digital information on users’ views, holds great potential for providing real-time and clear guidance to emergency response staff during an emergency (Dzermansky et al., 2021). With this technology, users can monitor digital data, information, images, and the real world at the same time. Due to this advantage, augmented reality was successfully applied to guide the maintenance and assembly tasks in the manufacturing industry. Additionally, its integration into the field of crisis communication represents a significant advancement in how information is conveyed during emergencies. In this regard, augmented reality enhances situational awareness by overlaying digital information onto the physical world, providing users with critical, context-specific data in real-time. This capability is particularly valuable in high-stress situations such as natural disasters or emergency evacuations where timely and accurate information can be the difference between safety and danger (Dzermansky et al., 2021; Yoo et al., 2023).

Additionally, ‘crowdsourcing’ is another technological trend that gained prominence in crisis communication and is associated with different types of online collaboration: ‘crowdfunding’, where the crowdsourcer asks citizens for financial contributions, and ‘co-creation’, a process that enables news makers and the public collaborate to produce journalistic content through crowdsourced data (Aitamurto, 2019; Tavra et al., 2021). In fact, crowdsourcing requires digital platforms, such as social media and specialized apps, that facilitate the collection of users contributions and which have been proven invaluable in providing real-time insights during emergencies. For instance, social media and open-source platforms have been extensively used during natural disasters to gather firsthand accounts, monitor public sentiment, and track the spread of misinformation (Aldin Alhaffar et al., 2023; Nielsen et al., 2023). Consequently, their application in crisis communication enables media organizations and public authorities to collect crowdsourced data, providing constant updates during crises (Vermicelli et al., 2020).

‘Big data’ and ‘big data analytics’ have also gained ground in crisis communication, allowing the extraction of large volumes of unstructured information that support decision-making during emergencies (Bukar et al., 2022; Chernobrov, 2018). Specifically, their role has become crucial, as they enable contemporary media organizations and political leaders to gain vital information regarding a crisis event, supporting precise targeting of messages and better resource allocation. Notable examples include the utilization of big data analytics in tracking the spread of a crisis,

assessing the needs of affected populations and allocating resources effectively (Bag et al., 2023; Sheng et al., 2021).

2.2. Using technological trends in contemporary journalism for managing emergencies

The incorporation of augmented reality, crowdsourcing, and big data into journalism has attracted significant attention during emergencies, as these trends offer new opportunities for collaboration and effective crisis management. Through a range of innovative tools and techniques, citizens, journalists and NGOs can work together to address emergencies more efficiently (Dzermansky et al., 2021; Pánek et al., 2017).

To begin with, various applications of augmented reality have been explored within the domain of crisis communication. One of its primary uses is detected in disaster management, where it aids first responders, by providing real-time data overlays, such as building layouts, victim locations, and hazardous material warnings. Additionally, augmented reality can significantly improve situational awareness, allowing responders to make quicker and more informed decisions. For example, AR systems could be instrumental in enhancing the efficiency of emergency response teams by providing crucial data at a glance. Augmented reality is also being employed to disseminate vital information to the public during crises. For instance, in scenarios such as hurricanes or floods, AR applications can guide individuals to safe zones or provide updates on the status of emergency shelters (Schwarz et al., 2016).

The adoption of augmented reality in journalism during crises has helped bridge the gap between complex real-time events and audience understanding, enhancing the ability to visualize and interact with data in meaningful ways. Augmented reality has emerged as a game-changing tool in crisis journalism, enabling reporters to provide contextualized, real-time information. Specifically, it is useful during natural disasters, political crises, or public health emergencies, where visualizing dynamic changes in the environment can help people make informed decisions. Research has indicated that AR significantly improves the public's ability to respond effectively to emergencies by offering visual and interactive representations of otherwise complex or abstract data. By offering immersive and accessible real-time updates, AR enhances the public's understanding and reaction to evolving crises. AR-based storytelling enables users to actively engage with content, leading to greater information retention and comprehension, which is critical during fast-moving crisis events. AR systems can also help users visualize disaster recovery efforts by showing real-time satellite data or drone footage overlaid onto digital maps, offering a clearer understanding of both the immediate impact and the response measures being taken (Johnson et al., 2021; Milgram & Kishino, 2019; Yoo et al., 2023).

Crowdsourcing has also become an essential tool in journalism, particularly in improving crisis communication by gathering real-time data from the public, enabling faster, more accurate responses while fostering public involvement in managing emergencies (Aitamurto, 2019). The integration of collaborative technologies and open-source platforms has further enhanced the role of crowdsourcing in journalism, bridging individual contributions with structured, data-driven crisis management tools. Media organizations and governmental mechanisms can now utilize such technologies to better manage crises by collecting, visualizing, and mapping real-time data. For example, Ushahidi, a Kenyan non-profit, developed an open-source software, that has been widely

used by media organizations during crises as it allows citizens to submit crisis reports via mobile phones, creating a temporal and geospatial archive of events (Pánek et al., 2017; Ushahidi.com, n.d; Vermicelli et al., 2020). OpenStreetMap, another open-source platform, provides detailed maps that are constantly updated by users. These maps are often used to validate the impact of crises and generate infographics that visually depict disaster spread (Anthony, 2018).

The aforementioned examples highlight the significance of collaborative tools in journalism, with the purpose of providing effective crisis management through crowdsourced data collection. Journalists are increasingly turning to platforms like Ushahidi and OpenStreetMap that allow real-time crowdsourcing, enabling citizens to contribute, access, and critique crisis information, fostering a more collaborative and participatory approach to news production. This shift marks a departure from traditional solitary reporting, empowering journalists with dynamic public input during crises (Aldin Alhaffar et al., 2023; Aitamurto, 2019; Anthony, 2018).

Big data and big data analytics are also crucial in order for effective crisis management to be achieved. For instance, social media data from citizens, which are considered high volumes of users' information, can enhance understanding of an emergency, ultimately leading to more effective and robust crisis communication (Aitamurto, 2019; Boersma & Fonio, 2017; Chernobrov, 2018). By harnessing social media data, journalists and governments can gain a complete picture of a crisis, with the aim of identifying potential risks and challenges (Jensen, 2022). With the advent of digital tools, such as Twitcident, that detect, follow and monitor users' posts on social networks for the purpose of maintaining security in urban environments, journalists can gather firsthand information during emergencies, allowing them to report on related events more accurately and promptly (Boersma & Fonio, 2017; Bukar et al., 2022). Although big data offers significant advantages in crisis situations, they introduce major challenges for journalism. As media experts shift towards automative processes, where algorithms utilize huge amounts of data to generate news content with minimal human intervention, the risk of simplifying complex stories and failing to capture significant aspects of crises is increased. Consequently, concerns regarding the quality and accuracy of news being disseminated during crises have also emerged (Lewis, 2014; Sheng et al., 2021).

3. Methodology

Considering the impact of augmented reality, crowdsourcing, and big data in the current media landscape, alongside the emergence of recent socio-political crises (e.g. the Russo-Ukrainian and Israel-Palestine war), this study aims to examine how these technological trends enhance collaboration and engagement among audiences, journalists and NGOs during crisis situations. By focusing on EU-based media and NGOs which have recently adopted related technologies to effectively contribute to crisis management, it evaluates their transformative role in contemporary crisis communication. To address its purpose, this paper has employed a 'case study research' which refers to a qualitative approach with the investigator exploring a bounded or multiple bounded systems (cases) over time through detailed data collection from various sources (e.g. observations, articles, documents and reports) (Creswell, 2007). According to Yin (2003), case studies are a preferred strategy when "how" or "why" questions are being posed, as they facilitate

a comprehensive evaluation of the outcomes and are frequently used in social sciences. (Yin, 2003).

Taking the above into account, this paper examines and analyzes the following case studies (Table 1):

Table 1: Presentation of the cases studies

Case study	Creator
GCC’s crisis coverage by using augmented reality for empowering digital storytelling (Hill, 2017).	Al Jazeera English
“Eyes on Russia Map” using crowdsourced data to depict Russia’s invasion in Ukraine (Barney, 2023).	Centre For Information Resilience (CIR)
Static maps using big data from MapBox and OpenStreetMap for Ukraine war (Al Jazeera, 2024).	Al Jazeera

The case studies were selected according to the following selection criteria (Table 2):

Table 2: Selection criteria of the case studies

Selection criteria
Created by NGOs and/or EU media organizations.
Incorporation of augmented reality, crowdsourced and big data into design processes.
Addressing recent crises constantly affecting the EU public sphere.

The examination of the case studies is based in three stages. The first includes the presentation of each project, providing insights into their purpose and the technologies applied in their design. This aligns with Creswell's emphasis on detailed data collection in case study research, allowing for a comprehensive understanding of the context and the significance of each example (Creswell, 2007). The second focuses on the examination of audience engagement, analyzing how audiences participate and interact with each project. This stage involves the presentation of the media and materials used during each project’s design and aligns with Yin’s assertion that case studies provide insights into why and how these projects effectively foster audience interaction and comprehension (Yin, 2003). The third includes an assessment of the influence and effectiveness of the case studies in managing and communicating about the crises they represent. This entails presenting data that justify the impact of each project on public perception and crisis management. It also aligns with Creswell's emphasis on reporting case-based themes to reveal broader patterns and implications stemming from the individual case studies, while reflecting Yin’s focus on evaluating case studies’ outcomes (Creswell, 2007; Yin, 2003).

Following the aforementioned stages, this study provides comprehensible results with the aim of answering key research questions:

R.Q.1 How do augmented reality (AR), crowdsourcing, and big data enhance the effectiveness of crisis communication and management within the European Union, particularly among media organizations and non-governmental organizations (NGOs)?

R.Q.2 How do these technologies improve public engagement and collaboration between citizens, journalists, and NGOs during crisis management efforts?

4. Results

4.1. Gulf Cooperation Council crisis by Al Jazeera

The Gulf Cooperation Council (GCC) crisis, which unfolded in 2017, is a key case in the evolving landscape of crisis communication, particularly highlighting the role of augmented reality (AR), media innovation, and digital storytelling. The conflict centered around diplomatic tensions, with Saudi Arabia, the UAE, Bahrain, and Egypt imposing a blockade on Qatar, accusing it of supporting terrorism, which Qatar denied (Hill, 2017; Istituto Affari Internazionali, 2024).

During the crisis, Al Jazeera, a Qatari-based global media network, leveraged cutting-edge AR technology to deliver a dynamic, real-time explanation of the situation. By incorporating AR into its news broadcasts, Al Jazeera not only engaged its audience visually but also provided an immersive, contextualized narrative that made the complexities of the crisis more understandable. The use of AR allowed for enhanced storytelling, combining traditional news reporting with digital overlays of data such as updated flight paths, transport routes, and geopolitical maps (Hill, 2017). AR's role here went beyond just adding visual appeal—it offered a strategic communication tool. By integrating AR maps into their broadcasts, Al Jazeera could dynamically show the blockade's impact on citizens and businesses. The visual representation of import-export routes, for instance, highlighted the economic isolation Qatar faced, while the use of digital tools such as Viz World maps brought a tangible dimension to an otherwise abstract geopolitical issue. This visual interaction allowed viewers to not only consume information but to engage with it more deeply, facilitating a better understanding of how the blockade affected daily life (Hill, 2017).



Figure 1: *Illustration of the use of AR to explain the Gulf Cooperation Council Crisis by Al Jazeera* (screenshot from <https://www.newscaststudio.com/2017/10/26/al-jazeera-augmented-reality/>)

Al Jazeera during 2017 has renewed their studios using new venues features having a surreal design that combine massive video walls, glossy surfaces and architectural elements of the building itself to create a dynamic and functional newsgathering environment. They have created a studio with 16 Sony HDC cameras and more than 30 Motion Analysis Tracking sensors/cameras to track three Sony HDC cameras for immersive, augmented reality graphics generated through Vizrt. They have also created a smaller studio that is dedicated to immersive graphics, with a large video wall and motion-tracking camera system. For our case, Al Jazeera used a combination of AR graphics with Viz Virtual Studio, Viz World maps, and a video wall powered by Viz Engine. Rather than attempt to recreate the buildings in detailed 3D in Vizrt, however, the network opted to use simplified, blocky shapes that not only created a clean and modern look but also helped draw the eye to the map details (Vizrt).

The maps were designed as glassy floor slabs, using transparency to merge real and virtual elements. Bright gold, red, and pale orange highlighted countries and routes, while a dog-legged video wall displayed a virtual Doha coastline, creating seamless transitions. This high-end AR integration fostered interactive storytelling, making it central to news production. During the GCC crisis, Al Jazeera's use of AR underscored how emerging technologies can transform crisis communication and position media as leaders in digital innovation.

4.2. Eyes on Russia project by CIR and C4ADS

In January 2022, the Centre of Information Resilience (CIR), a UK-based non-profit organization, in partnership with the Center for Advanced Defense Studies (C4ADS), launched the “Eyes on Russia” project (eyesonrussia.org, n.d; Strick, 2024). The project aimed to collect, analyze and verify data contributed by citizens such as videos, photos, satellite images and other media related to Russia's invasion of Ukraine, developing an interactive map that offers policymakers, journalists and the public reliable information on the war's progression (Strick, 2024). The map is considered the updated version of the “Russia-Ukraine Monitor Map” which was previously developed by CIR in collaboration with the open-source intelligence (OSINT) community, including partners like Bellingcat and the Conflict Intelligence Team (Strick, 2023). Its aim is to provide timely, accurate information on the invasion's impact by using data contributed by citizens, volunteers and organizations across Europe, stored in a database of over 20,000 verified videos and photos (Strick, 2024; Wheeler, 2022).

Additionally, the project's general design allows users to interact with the represented data, providing interactive visualizations that depict the consequences of Putin's military adventurism and various functions like search features and filtering options. For instance, users can filter and display data on the map by category, sector, event date range, or by using the free-text search box (Centre For Information Resilience, 2022; Chow et al., 2024; eyesonrussia.org, n.d; Strick, 2023). Moreover, users can insert keywords, such as location names, into the free text box and use the timeline of verified data, identifying the dates associated with the data (e.g. data from February to March 2023 etc.).

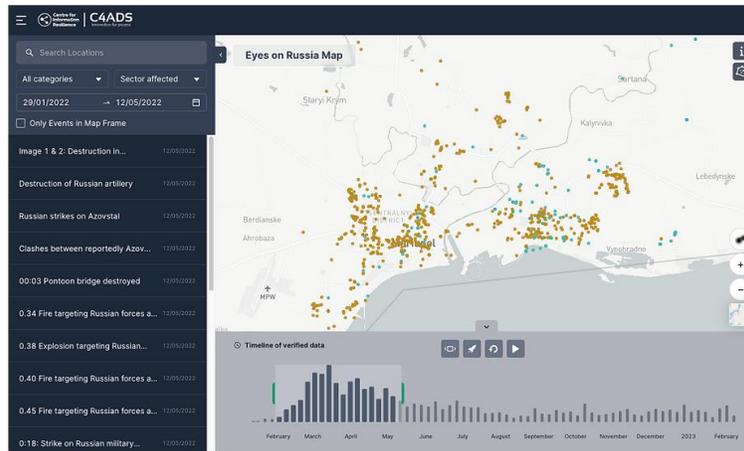


Figure 2: *Mariupol's depiction with the data from February to May 2022* (screenshot from <https://www.info-res.org/post/eyes-on-russia-documenting-conflict-and-disinformation-in-the-kremlin-s-war-on-ukraine>)

At this point, it is worth noting that most of the map's represented data (e.g. videos, images etc.) come from international media, research centers and citizens' posts on social media. For instance, the Footage likely from an Inokhodets UCAV showing Russian strikes on Azovstal is a title of a video displayed on the list below the maps' main categories, which was reposted by a user's account on X and was incorporated into the project.

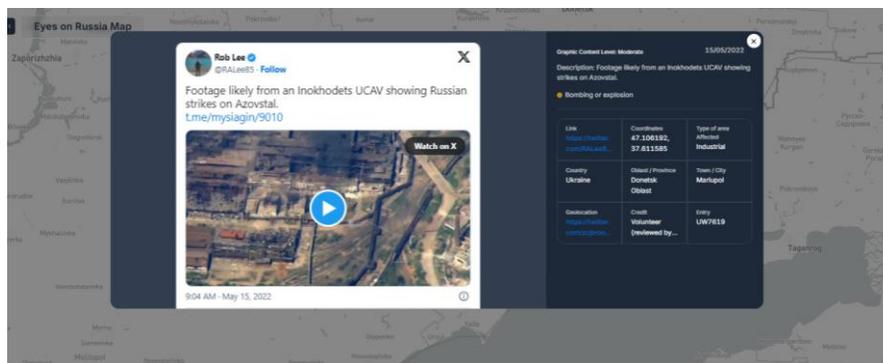


Figure 3: *Users contributions to the "Eyes on Russia Map"* (screenshot from <https://eyesonrussia.org/>)

Furthermore, the map is publicly viewable on both desktop and mobile and as of July 24, 2023, has had over 3.5 million total views (Strick, 2023). Its data has been used by various EU media to effectively cover the Russia-Ukraine war (Barney, 2022; Centre For Information Resilience, 2022; Strick, 2023). For example, The Guardian used the map's infrastructure damage data on its daily news reporting to expose hundreds of incidents of infrastructure damage from September 2022 to January 2023 (Voce et al., 2023). BBC was based on CIR's analysis of images of Staryi Krym for its Panorama program to reveal that more than 1,500 new graves had been dug there since the last image analysis in June 2022 (Andersson, 2022). Lastly, one of the major contributions of "The Eyes on Russia" project is the transparency it brings, providing real-time data and a detailed visual representation of the Russo-Ukrainian conflict. This real-time documentation has been crucial for

journalists, policymakers, and justice bodies in understanding the conflict, documenting damage to civilian infrastructure and archiving evidence for accountability and justice efforts. (Barney, 2022; Strick, 2024; Strick, 2023).

4.3. Series of static maps into daily news by Al Jazeera

Since 2022, Al Jazeera has incorporated a series of static maps into their daily news, creating a narrative of the war between Russia and Ukraine. For instance, on February 24, 2022, the day Russia invaded Ukraine, Al Jazeera published an article titled *Mapping Russian attacks across Ukraine*. This article aims to explain the multifaceted impact of the Russia-Ukraine conflict, detailing how it started, its immediate effects, and the broader implications for the international community in terms of security, economy, and politics (Al Jazeera Staff, 2022; Barney, 2022). For such purposes, the article includes a series of static maps that depict data from open-source mapping platforms such as OpenStreetMap, platforms that provide geolocation data such as MapBox and non-profit, non-Partisan think tanks. These maps contribute to the broader narrative of the war by presenting data such as confirmed locations in Ukraine that came under attack on February 24, 2022 (Al Jazeera Staff, 2022; mapbox.com, n.d; wiki.openstreetmap.org, n.d).

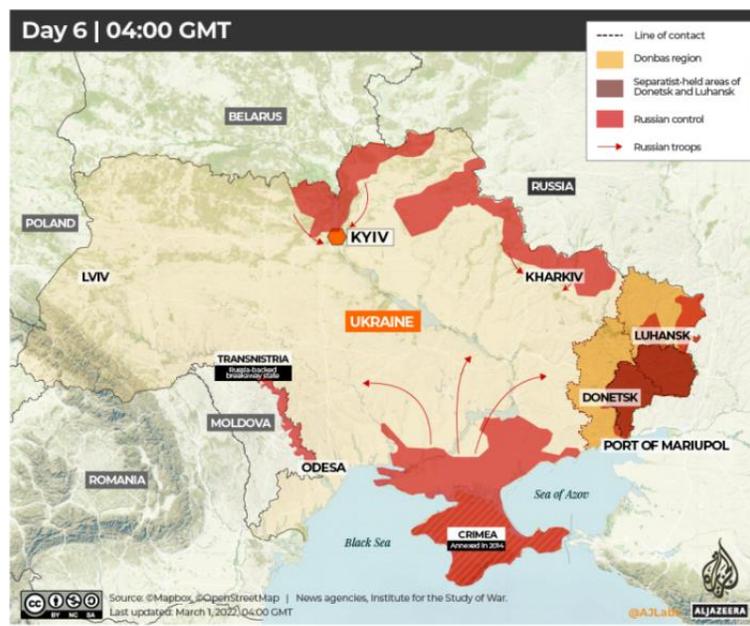


Figure 4: The first map of the article that shows known locations in Ukraine that had come under attack on February 24, 2022 (screenshot from <https://www.aljazeera.com/news/2022/2/24/mapping-russian-attacks-across-ukraine-interactive>)

In this context, these maps enable readers' to better understand the impact of the Russian invasion of Ukraine as well as the political framework that shapes the relations between those countries. For instance, a static map shows NATO's expansion in the Balkans since 1949, paired with references to Russia's demand for non-expansion, helping readers better understand the roots of the Russia-Ukraine war. (Al Jazeera Staff, 2022). Such combinations can also be observed in various articles associated with the war in Ukraine. For instance, a news article titled Infographic: Military capabilities of Russia and Ukraine which was published on February 25, 2022, by Al

Jazeera highlights the years of tensions between Russia and Ukraine while it is also referring to the avoidance of the direct involvement of the West in the war that had just begun. In this case, maps are vital for visualizing the Russia-Ukraine conflict, detailing troop movements, invasion routes, and strategic sites. They illustrate NATO's presence in Eastern Europe and track military advances, offering readers essential insights into the ongoing crisis and ground control. It is worth mentioning that Al Jazeera also uses hyperlinks into such articles that enable readers to detect a greater range of information about the war (Duggal, 2022).



Figure 5: A map that depicts the Russo-Ukrainian conflict step by step (screenshot from <https://www.aljazeera.com/news/2022/1/25/infographic-military-capabilities-of-russia-and-ukraine-interactive>)

Furthermore, the creation of these maps relies on vast amounts of data from key sources used by Al Jazeera. For instance, OpenStreetMap is a collaborative, open-source platform offering extensive geolocation data contributed by users globally. MapBox provides high-value mapping datasets, supported by over half a billion monthly active users, enhancing the maps' credibility and accuracy (mapbox.com, n.d; wiki.openstreetmap.org, n.d). Therefore, Al Jazeera's approach in terms of covering Russo-Ukrainian crisis provides a better understanding regarding the causes, the effects and the progress of the war. Visualized content enables readers to create an overall image in terms of the implications of the particular crisis, increasing public awareness. Al Jazeera's constant updates regarding the ongoing conflicts also enhance decision-making processes in order for governors to effectively manage the particular crisis (Barney, 2022).

5. Discussion and future research

Taking the results into account, this paper offers thorough and comprehensive answers to the aforementioned research questions. Specifically, Augmented Reality transforms passive information consumption into interactive experiences. Al Jazeera's coverage of the Gulf Cooperation Council crisis leveraged AR to overlay digital data onto real-world environments. This visual aid allowed audiences to comprehend complex geopolitical situations more intuitively. The real-time visual updates, such as transportation routes and economic impacts, bridged the gap between abstract information and tangible outcomes for affected citizens. Beyond AR as a visualization tool, it acts as a crucial strategic asset for media organizations. By allowing media entities to present crises with layers of interactive, real-time data, AR doesn't merely facilitate understanding but fosters informed decision-making. NGOs and government bodies could use AR in broader applications like disaster preparedness and response planning, making AR a central technology in preemptive crisis mitigation.

Moreover, the ability to gather real-time data from the public during crises, as seen in "The Eyes on Russia Project," showcases the transformative potential of crowdsourcing. By tapping into the collective intelligence of the public, crowdsourcing this initiative has managed to create a multidimensional, real-time dataset that can be used by media organizations, governments, and NGOs to make faster and more accurate decisions. The transparent and verified nature of this data ensures that crisis communication strategies are based on reliable inputs from the public, creating a crowdsourced approach, that not only empowers citizens to participate in crisis reporting, but it also democratizes the flow of information. Instead of relying solely on top-down narratives from journalists or governments, it crowdsourcing ensures a two-way flow of information. Making crisis communication more inclusive, leading to heightened collaboration between citizens, media outlets, and NGOs, and enhancing the overall response to crises.

Additionally, big data's role in crisis communication lies not only in its sheer volume but also in its ability to provide accuracy and depth in news reporting. For example, Al Jazeera's use of big data in daily news enhanced the effectiveness of crisis communication, by providing detailed, static visualizations of the Russia-Ukraine conflict. Through static maps that incorporate data from open-source platforms such as OpenStreetMap etc., Al Jazeera was able to provide accurate and contextually rich information that can potentially be used support media organizations and NGOs during crisis reporting. As seen in the "Eyes on Russia" project and Al Jazeera's news reporting, AR, crowdsourcing and big data promote a collaborative environment where the public, media organizations, and NGOs work in unison. By allowing users to contribute their data and engage with crisis narratives in real-time, these initiatives break the traditional boundaries of crisis reporting. This fosters a more inclusive approach, making public participation a critical element in both crisis communication and management. The three case studies—Al Jazeera's use of Augmented Reality (AR) during the Gulf Cooperation Council (GCC) crisis, the "Eyes on Russia" project, and Al Jazeera's static maps of the Russia-Ukraine conflict—offer distinct approaches to leveraging emerging technologies in crisis communication. While they all aim to improve public understanding and responsiveness in times of crisis, they differ in their use of technology, audience interaction, collaboration, and transparency.

Al Jazeera's AR integration during the GCC crisis is a prime example of how Augmented Reality can enhance user engagement through real-time, immersive storytelling. By overlaying digital data, such as flight paths and geopolitical maps, onto the real world, AR offered audiences a dynamic way to understand the complex crisis. This interactive medium allowed viewer to see the immediate effects of the blockade on Qatar's citizens and economy. In contrast, the "Eyes on Russia" project used crowdsourced and social media data and interactive mapping to provide a real-time, constantly updated portrayal of the Russia-Ukraine conflict. The project allowed users to interact with data, creating an even higher level of interactivity than AR by enabling user contributions. Meanwhile, Al Jazeera's static maps of the Russia-Ukraine conflict, though informative, provided limited real-time interaction. The maps relied on big data but were published as static visual aids, lacking the real-time dynamism of AR or the participatory nature of crowdsourcing.

The three case studies also vary significantly in terms of public collaboration. In the AR coverage of the GCC crisis, the engagement was primarily passive. Viewers consumed the visually enhanced data provided by journalists but had no direct means to contribute to the crisis communication process. Conversely, the "Eyes on Russia" project exemplified active public collaboration, inviting contributions from citizens, journalists, and NGOs. Crowdsourcing was at the heart of this project, with user-generated content such as videos and social media posts forming the backbone of the data presented. This crowdsourced approach fostered a sense of collaboration between the public and media organizations, making the public an active participant in crisis reporting. Al Jazeera's static maps, by contrast, provided no such interactivity. The maps were created using pre-verified big data from platforms like OpenStreetMap, but there was no mechanism for the public to directly contribute or interact with the information beyond reading the maps and articles.

In terms of transparency and accuracy, all three case studies excelled but in different ways. Al Jazeera's AR visuals during the GCC crisis delivered verified real-time data from trusted sources, ensuring that the audience had accurate information. However, this data was controlled and curated by the media organization, with little opportunity for public involvement. On the other hand, the "Eyes on Russia" project had a much more transparent and participatory approach to data collection and verification. Crowdsourced data was rigorously checked by journalists, NGOs, and open-source intelligence communities, ensuring its accuracy while fostering public trust. The open, collaborative nature of the project meant that it was not just media professionals controlling the flow of information, but the public played a critical role as well. Al Jazeera's static maps, while also accurate, lacked the immediacy and interactive verification processes present in the other two cases. The maps were curated using open-source data, but the static nature of the content and lack of real-time updates limited their transparency compared to the other projects.

Real-time responsiveness varied greatly across the three case studies. Al Jazeera's AR coverage provided a near real-time understanding of the GCC crisis through constantly updated visual overlays. This allowed for a more immediate grasp of the evolving situation, but the updates were still tied to the timing of broadcast schedules. The "Eyes on Russia" project was the most responsive of the three, offering real-time updates based on crowdsourced data that was constantly verified and displayed interactively. This allowed users to search for specific data and see how the conflict was unfolding in real-time. In contrast, Al Jazeera's static maps were less responsive. Although they provided detailed visualizations, they were static and updated periodically, meaning

they could not offer the same level of immediacy or real-time engagement as AR or crowdsourced maps.

In terms of raising public awareness, Al Jazeera's AR use during the GCC crisis provided a highly engaging way to convey complex information. The immersive visuals helped audiences better understand the geopolitical impact of the blockade, enhancing public comprehension and engagement. The "Eyes on Russia" project, however, had a broader and more significant impact on global awareness. The crowdsourced and verified data provided an unparalleled level of transparency and engagement, influencing both public perception and policy decisions. The real-time data and interactive nature of the project ensured that the public was not just passive consumers but active contributors to crisis reporting. Al Jazeera's static maps, while helpful in providing a clear geographic understanding of the Russia-Ukraine conflict, lacked the depth of engagement present in the other two case studies. The maps were effective at raising awareness but did not provide the same immersive or interactive experience.

It is worth noting that augmented reality, crowdsourcing and big data have been successfully applied across different types of crises, including natural disasters, public health emergencies etc. For instance, the "Wildfire AR" app overlays real-time data about fire locations, spread patterns, and safe zones onto the user's surroundings. This helps emergency responders visualize fire fronts, smoke zones, and wind direction, which assists in strategic planning and resource allocation (Bhattarai, 2020). Residents benefit by receiving critical guidance on evacuation routes, allowing for timely and safe departures. The real-time spatial awareness provided by AR has been shown to reduce response times and enhance public safety by minimizing the risk of casualties (Bhattarai, 2020). Similarly, augmented reality plays a crucial role in earthquake preparedness. Apps such as "QuakeAlert USA" simulate real-time earthquake impact zones, enabling users to visualize fault lines and affected areas. These simulations empower individuals and communities to conduct evacuation drills and understand safety protocols, fostering a culture of preparedness (Dzermansky et al., 2021).

The interactive nature of augmented reality also helps people practice responses, making emergency actions more familiar and effective when an actual crisis occurs. Augmented reality's benefits extend beyond immediate responses to long-term resilience. Its ability to visualize potential hazards encourages proactive measures, better planning, and improved infrastructure readiness in vulnerable areas. In addition to natural disasters, AR's interactive visual tools have proven beneficial in public health crises. During the COVID-19 pandemic, augmented reality applications were used to demonstrate hygiene protocols and social distancing measures. This interactive guidance not only improved public compliance but also supported healthcare training by allowing medical personnel to practice emergency procedures safely through 3D simulations (Jung, 2022).

Additionally, crowdsourcing played a crucial role in Australia's bushfire in 2019 and 2020, enhancing responsiveness and providing citizens with a greater understanding for the crisis. In this context, news media effectively used social media and crowdsourced data to enhance their coverage, noting hashtags like #AustralianFires and #supportingaustralia that helped mobilize global support and awareness. Furthermore, Facebook's Disaster Map, that included emergency services with real-time data for better risk assessment and resource allocation, was also highlighted

on daily news reporting. Lastly, local media organizations amplified personal stories from affected citizens, strengthening public empathy and understanding (Mack, 2020).

Furthermore, media outlets like The Guardian utilized big data in its coverage of the Covid-19 pandemic to provide their audiences with a better understanding of the crisis. By employing various data-driven methods to track the spread of the virus, analyze mortality rates, and highlight disparities in health outcomes among different demographics, the Guardian made complex information accessible and understandable to the public. Guardian's decision to release their internal data tracking efforts for public use led to a greater engagement, with millions of views on their summary pages. This transparency enhanced collaboration with researchers and citizens alike, fostering the accuracy and relevance of their reporting (Chalabi, 2020).

Future research could explore several key areas to enhance the understanding and application of augmented reality, crowdsourcing and big data in crisis communication. Related studies may focus on how crowdsourced and big data enhances crisis reporting, by creating real-time on-the-ground insights, encouraging fact-checking or supporting resource allocation. A deeper investigation in terms of the strategies used for verifying users' contributions and countering disinformation during emergencies is also required. Moreover, a longitudinal study tracking the evolution of crisis communication tools and their long-term effects on public engagement and media consumption could offer a deeper understanding of the effectiveness of tools such as interactive maps and AR overlays. This approach would shed light on the sustained impact of technological advancements in crisis management and communication. Lastly, research on the integration of Artificial Intelligence (AI) in crisis reporting could reveal both opportunities and challenges associated with automated journalism. Examining AI's role in enhancing the accuracy, speed, and ethical considerations of real-time reporting would contribute to the broader discourse on the future of journalism in crisis scenarios.

6. Conclusions

Overall, this paper underscores how AR, crowdsourcing, and big data have reshaped crisis communication, each offering unique strengths in visualization, public participation, and real-time responsiveness. Al Jazeera's AR coverage of the GCC crisis showcased immersive, real-time storytelling, enhancing audience comprehension but lacking interactive public involvement. The "Eyes on Russia" project, driven by crowdsourcing, democratized crisis communication by enabling public collaboration, verified data sharing, and direct participation in reporting. Al Jazeera's static maps, while highly informative and data-rich, were limited in immediacy and interactivity. Together, these case studies illustrate that emerging technologies can transform crisis communication from one-way reporting into a dynamic, participatory process. They demonstrate that real-time, interactive tools not only improve comprehension of complex issues but also foster public trust and collaboration, crucial in volatile crisis situations.

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***Digital Crisis Communication and
Audience Interaction***

Organizational Resilience in the Digital Era: Leveraging Social Media Platforms for Crisis Communication

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Abstract. This paper explores the critical role of crisis communication in contemporary organizations, emphasizing the growing importance of digital media in shaping communication strategies. As technological advancements and societal shifts redefine how institutions interact with stakeholders, entities face increasing pressure to safeguard their reputations and maintain public trust, particularly in times of crisis. Drawing on recent data predicting a rise in unforeseen crises, this study examines how crisis communication serves as a strategic framework for risk identification, prevention, and responsive action. Special attention is given to the integration of traditional and digital communication tools, as well as the principles of transparency, timeliness and consistency in managing reputational risks. The paper proposes a coding categorization model to support future empirical research, offering a structured approach for analyzing organizational responses in crisis scenarios. Ultimately, the findings highlight the necessity of adaptative, proactive, and multi-platform communication strategies that enable institutions to respond effectively in an increasing complex and fast-paced media environment.

Keywords: Crisis communication strategies; Reputation management; Digital media in crisis management; Crisis response frameworks; Comprehensive crisis communication

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1. Introduction

In the contemporary era, technological advancements and profound transformations in societal communication practices demand a heightened focus on organizational communication strategies. Entities must not only protect and enhance their reputations but also cultivate a positive public image through effective messaging to diverse stakeholders. The evolution of new media has emerged as a pivotal element in this communication paradigm, marking its prominence in the second decade of the 21st century, and organizations are increasingly recognizing the potential of these platforms as conduits for disseminating critical information, particularly in mitigating the adverse effects of negative events that could severely impact their reputations. Historically, crises have pervaded various sectors of human activity, arising from an array of risks inherent in the human condition. Data from the Institute for Crisis Management (2020) indicates a projected exponential increase in unpredictable crises over the coming years, underscoring the necessity for governments, institutions, and enterprises to be adeptly prepared to respond. Effective crisis communication emerges as an essential theoretical framework for identifying risks, preventing crises, and responding decisively when crises occur. Developing comprehensive crisis communication strategies that address the unique contexts of different organizations is imperative. Such strategies should involve pre-established protocols that identify relevant stakeholders and outline effective engagement with the media (Payton, 2021; Contreras-Pacheco, Álvarez-Arciniegas & Garnica-Rugeles, 2024).

Moreover, a thorough examination of crisis communication encompasses the principles of effective messaging, emphasizing the critical stages of information exchange before, during, and after a crisis. Key elements such as transparency, consistency, and timeliness are essential in mitigating reputational damage and restoring public trust. The rapid proliferation of social media and digital platforms has transformed the landscape of crisis communication, presenting both opportunities for real-time engagement and challenges associated with the swift dissemination of information, including the risk of misinformation (Civelek, Çemberci & Eralp, 2016).

This paper aims to investigate best practices in crisis communication, exploring relevant concepts and providing an analytical framework for understanding the adaptation of crisis management strategies in unfavorable conditions within the digital environment. The research paper proposes coding categorization as a framework for future empirical studies, thereby offering a theoretical and practical contribution.

Ultimately, the findings will reinforce the necessity of an integrated and agile communication approach that leverages both traditional and digital channels to ensure comprehensive crisis management in an increasingly volatile global landscape.

2. Crisis Communication in organizations – conceptualizations, importance, objectives

Crisis communication has become an essential aspect of organizational management, particularly in today's volatile and interconnected global environment. As organizations face increasing risks, including natural disasters, technological failures, and reputational threats, effective crisis

communication strategies are crucial for safeguarding institutional integrity and maintaining stakeholder trust. In light of these challenges, organizations are compelled to develop robust frameworks for crisis communication that not only address immediate concerns but also contribute to long-term resilience (Lauran et al., 2019; Snoeijers & Poels, 2018). This paper discusses key conceptualizations of crisis communication, its importance in organizational resilience, and the primary objectives that guide communication strategies during crises.

Crisis communication is defined as the process of conveying information to stakeholders during a crisis situation, aimed at mitigating damage and facilitating recovery. It encompasses a range of activities, including information dissemination, stakeholder engagement, and message management. According to Coombs (2007), crisis communication can be conceptualized through the Situational Crisis Communication Theory (SCCT), which posits that the response strategy employed by an organization should be aligned with the crisis type and the organization's responsibility for the crisis. This theory emphasizes the importance of situational analysis in selecting appropriate communication responses. By categorizing crises based on factors such as the organization's culpability and the nature of the crisis, SCCT provides a nuanced understanding of how organizations can tailor their communication strategies to effectively address the needs of various stakeholders. This strategic alignment not only enhances the credibility of the organization but also contributes to more effective management of the crisis. Further expanding on the concept, Ulmer et al. (2017) argue that crisis communication involves both reactive and proactive elements. Reactive communication addresses immediate concerns during a crisis, while proactive communication entails pre-crisis planning and preparation to prevent or minimize potential crises. This dual approach is essential for organizations to effectively navigate the complexities of crisis situations. Proactive measures may include conducting risk assessments, developing crisis communication plans, and training employees to respond effectively during a crisis. By investing in these proactive strategies, organizations can mitigate the impacts of potential crises before they escalate, thereby ensuring a more streamlined and efficient response when crises do occur.

The significance of crisis communication cannot be overstated. A well-crafted crisis communication strategy can significantly influence the outcome of a crisis, helping organizations to manage public perception and maintain credibility. According to the Institute for Crisis Management (2020), effective crisis communication contributes to organizational resilience by enabling entities to adapt to unexpected challenges and recover more swiftly. In today's landscape, where information spreads rapidly through social media and other digital platforms, the ability to communicate effectively during a crisis can differentiate between organizational survival and failure. Organizations that excel in crisis communication not only protect their reputations but also create a foundation for sustained stakeholder trust and loyalty (Sun, 2023) and are more likely to restore public confidence and mitigate reputational damage (Fearn-Banks, 2016; Frandsen & Johansen, 2017). The importance of timely and accurate information dissemination is underscored by the increasing prevalence of social media, where misinformation can spread rapidly, exacerbating the crisis situation. In this context, organizations must be proactive in monitoring social media channels and responding to misinformation in real-time. By addressing false narratives swiftly, organizations can not only correct the record but also reinforce their commitment to transparency and accountability, further strengthening stakeholder relationships.

Additionally, crisis communication plays a vital role in organizational learning. As organizations analyze their responses to past crises, they can identify strengths and weaknesses in their communication strategies, facilitating continuous improvement. This reflective practice is essential for developing robust crisis communication frameworks that enhance preparedness for future crises. Organizations that engage in post-crisis evaluations can derive valuable lessons about what worked and what did not, informing their future crisis management strategies. This continuous cycle of learning and adaptation is particularly important in an era of rapid change, where the types of crises organizations face are constantly evolving.

The primary objectives of crisis communication can be categorized into several key areas. One of the foremost objectives is to provide accurate and timely information to stakeholders. Organizations must ensure that relevant parties, including employees, customers, and the media, receive clear messages about the nature of the crisis and the organization's response efforts (Coombs, 2018). This objective underscores the importance of having a well-defined communication strategy that outlines who communicates what information, to whom, and through which channels. Bailey (2023) refers that clarity and consistency in messaging are paramount during a crisis, as confusion can lead to increased anxiety among stakeholders and can further exacerbate the situation.

Another critical objective is to protect and manage the organization's reputation. Effective crisis communication aims to prevent long-term damage to the organization's image by addressing the concerns of stakeholders and demonstrating accountability. Organizations that engage in proactive reputation management during crises can foster greater trust among their stakeholders (Coombs, 2018; Meyers & Holusha, 1987; Spradley, 2017). This involves not only responding to crises as they occur but also engaging in activities that reinforce the organization's commitment to ethical practices and social responsibility over the long term. Such proactive reputation management may include community engagement initiatives and regular transparency reports that showcase the organization's values and ethical commitments.

Engaging stakeholders is essential during a crisis. Organizations must actively communicate with affected parties, allowing for dialogue and feedback. This engagement fosters a sense of inclusion and helps to alleviate stakeholder concerns, contributing to a more favorable crisis outcome. Moreover, involving stakeholders in the communication process can create a sense of shared responsibility and collaboration, which can be invaluable during difficult times. This proactive engagement can also serve as a means to identify potential issues before they escalate into crises, thus enhancing the organization's overall crisis preparedness. By cultivating relationships with stakeholders prior to a crisis, organizations can facilitate more effective communication during emergencies.

Finally, crisis communication plays a critical role in the recovery phase following a crisis. Organizations must communicate their recovery plans and progress to stakeholders, reinforcing their commitment to transparency and accountability. This ongoing communication is vital for rebuilding trust and facilitating the organization's return to normal operations. The recovery phase also presents an opportunity for organizations to reflect on their crisis management practices and consider how they might improve their systems and processes moving forward.

(Ulmer et al., 2017; Forni, 2019). Effective communication during recovery can help to reassure stakeholders that the organization is committed to learning from the crisis and making necessary changes to prevent future occurrences.

3. Strategic principles of Crisis Communication - before, during, and after

Effective crisis communication is a multifaceted process that requires meticulous planning, quick decision-making, and consistent, transparent communication before, during, and after a crisis. The principles governing crisis communication are not only aimed at mitigating immediate damage but also at restoring long-term organizational health and public trust. This holistic approach can be broken down into three phases: before the crisis, during the crisis, and after the crisis. Each phase demands distinct, but interrelated strategies to ensure that the organization is not only prepared to address a crisis but also equipped to recover from it (Coetzee & Niekerk, 2012).

a) Before the crisis: laying the groundwork for effective crisis communication

Crisis communication begins long before an actual crisis occurs. Preparation is key, and it starts with setting clear, well-defined communication goals. These goals should center around three primary objectives: maintaining public trust, protecting the organization's reputation, and ensuring business continuity. Effective crisis communication can only be achieved when the organization has outlined specific, measurable objectives that address both short-term mitigation and long-term recovery. For instance, communication strategies should aim to minimize the reputational damage caused by the crisis while assuring stakeholders of the organization's commitment to resolving the situation promptly and effectively (Eugeni et al., 2023).

A critical component of pre-crisis planning is identifying and analyzing target audiences. Organizations must have a deep understanding of the stakeholders who will be most affected by the crisis, such as employees, customers, investors, regulatory bodies, and the media. Each group has unique concerns and expectations, and tailoring messages to address these concerns is vital for reducing confusion and preventing misinformation. Clear, targeted messaging ensures that stakeholders are not left in the dark, which can often exacerbate a crisis. Understanding the needs of each group before the crisis enables an organization to communicate swiftly and accurately when the situation arises.

In addition to identifying key stakeholders, organizations must assess potential risks. This means evaluating both internal and external threats that could escalate into a crisis. The risk assessment should involve identifying possible crisis scenarios—ranging from reputational damage to operational disruptions to legal issues. By understanding the types of crises that could arise, organizations can devise mitigation strategies and contingency plans. This proactive approach helps ensure that there are predefined responses to specific types of crises, reducing the time it takes to act and preventing further escalation (Schwarz, 2019). Identifying vulnerabilities in communication channels is also essential in this stage. A crisis often exposes weaknesses in

communication strategies, and addressing these vulnerabilities before a crisis occurs is crucial to ensuring a more efficient response.

Choosing the right communication channels is another essential aspect of crisis preparedness. Different media platforms have varying reach and effectiveness. Social media is often the fastest and most direct way to communicate with the public, while official websites and traditional press releases offer a more controlled, formal communication outlet. Understanding how each platform serves the organization and its stakeholders ensures that messages are disseminated quickly and through the most effective channels (Claeys & Cauberghe, 2014; Elvegård, Andreassen, & Badu, 2024). Choosing the right media platforms enables the organization to reach its target audience swiftly and ensures the message remains consistent across all channels.

Equally important in the preparation phase is the development of a comprehensive crisis manual (Mikušová & Horváthová, 2019). This document serves as a practical guide for managing crises, outlining communication procedures, emergency contacts, and protocols for responding to various crisis scenarios. A crisis manual ensures that the organization is ready to act quickly when the need arises, providing a structured approach to crisis communication that minimizes chaos and confusion. The manual should also include templates for press releases and guidelines for spokespersons, ensuring that responses are consistent and professional. Additionally, this manual should be updated regularly to account for new risks, technologies, and communication trends. Finally, a well-established crisis communication team is indispensable. This team, typically composed of senior management, communications experts, legal advisors, and operational leaders, must be trained and prepared to handle a crisis. Clear roles and responsibilities should be assigned, and regular training exercises and simulations are essential for ensuring that team members are equipped to handle the pressure of a real crisis. By preparing a crisis communication team and establishing procedures and protocols in advance, organizations ensure that their response is coordinated and effective when a crisis occurs (Mir, Hassan, Ali & Kosar, 2016).

b) During the crisis: managing communication in real time

When a crisis occurs, prompt action is crucial. The first step in managing communication during the crisis is to activate the pre-established crisis communication team. With roles already defined, the team can immediately begin assessing the situation, formulating an appropriate response, and coordinating their actions. Quick decision-making is crucial, and the team must be prepared to handle both internal and external communications simultaneously.

The next immediate action is to issue an initial public statement. This statement should be issued as quickly as possible, acknowledging the crisis and providing an assurance that the organization is actively working to address the situation. Transparency is essential at this stage. If the organization is aware of the crisis but lacks full details, this should be communicated clearly to avoid speculation (Beeler, 2022). Transparency not only helps maintain trust but also prevents misinformation from spreading. A prompt, clear response indicates that the organization is in control, which can prevent the situation from escalating further.

Once the initial statement is issued, it is important to maintain communication through the designated channels. These may include the organization's website, press releases, social media

platforms, and direct emails to key stakeholders. It is essential to maintain a consistent message across all these platforms, as inconsistencies in communication can lead to confusion and undermine the organization's credibility (Jamal & Bakar, 2017). Social media, in particular, should be monitored continuously, as it is often the first place where misinformation spreads. Social media platforms should be used to provide updates, respond to inquiries, and address any concerns in real time. Maintaining regular communication ensures that stakeholders feel informed and reassured during the crisis (Seeger & Schwarz, 2024).

Frequent updates are critical throughout the crisis. These updates should be clear, concise, and fact-based. They should focus on what the organization is doing to resolve the crisis, what progress has been made, and what actions are still being taken. Providing timely updates not only helps keep stakeholders informed but also demonstrates that the organization is actively managing the situation. The updates should also convey any new information that may emerge, as failing to do so can lead to the perception that the organization is hiding details or is disorganized (Dutta & Pullig, 2011).

An essential action during the crisis is designating trained spokespersons to handle media inquiries. These individuals should be prepared to answer questions from the media and other stakeholders while ensuring that the organization's message remains consistent. Media training is critical to ensure that spokespeople are able to handle high-pressure situations effectively. They must remain calm, composed, and factual, providing information that is both clear and consistent. In addition to managing external communications, it is important for organizations to coordinate internal communications during the crisis. Clear communication with internal stakeholders is essential to ensuring that everyone within the organization is on the same page (Farmer, 2024; Snoeijers & Poels, 2018). This could involve holding internal meetings, sending out email updates, or setting up an intranet portal with real-time information. Employees should be provided with clear guidance on how to respond to external inquiries, ensuring that the organization speaks with one voice.

Monitoring public sentiment and media coverage is crucial throughout the crisis. By tracking how the crisis is being covered in the media and what is being discussed on social media platforms, the crisis communication team can assess the effectiveness of their messaging and adjust their approach if necessary. This monitoring also helps identify emerging issues and allows the team to address them before they escalate. Social listening tools and media monitoring platforms can provide valuable insights into how the organization is being perceived and what actions should be taken to correct any misinformation.

Finally, demonstrating accountability and empathy during the crisis is essential to rebuilding trust. Acknowledging mistakes, offering sincere apologies, and outlining the corrective actions that are being taken not only help to rebuild stakeholder confidence but also show that the organization is taking responsibility for its actions. Empathy for those affected by the crisis can go a long way in mitigating negative feelings and ensuring that stakeholders feel valued and heard. A crisis is an opportunity for the organization to showcase its commitment to resolving the issue and preventing future incidents (Frandsen & Johansen, 2017; Hersel, Helmuth, Zorn, Shropshire & Ridge, 2019).

c) After the crisis: restoring trust and preparing for the future

Once the immediate crisis has passed, communication efforts should shift toward recovery and long-term reputation management. The first step in post-crisis communication is to conduct a thorough debriefing with the crisis communication team. This evaluation should focus on the effectiveness of the communication strategy, the lessons learned, and areas for improvement. A post-crisis evaluation helps ensure that the organization can refine its crisis communication plan and improve its readiness for future crises.

Next, it is crucial to communicate the organization's actions and the lessons learned from the crisis to both internal and external stakeholders. A comprehensive post-crisis report should be shared, detailing the steps taken to resolve the crisis, the outcomes, and the measures implemented to prevent similar crises in the future (Soares, 2022; Tsarenko & Tojib, 2015). This transparent communication not only demonstrates accountability but also reassures stakeholders that the organization is committed to continuous improvement. By providing this information, the organization helps restore public confidence and shows that it has taken concrete steps to prevent future incidents.

Rebuilding the organization's reputation after a crisis is a key post-crisis communication task. It requires focusing on positive engagement with the public and highlighting the organization's efforts to improve its operations, policies, or services. This can involve showcasing corporate social responsibility initiatives, highlighting improvements made in response to the crisis, and engaging with stakeholders to rebuild relationships. Positive, consistent messaging across media channels, including social media, press releases, and public appearances, can help reshape the narrative and restore the organization's image over time (Kara, 2019; Pfarrer, Decelles, Smith & Taylor, 2008).

Moreover, it is important to continue communication with stakeholders even after the crisis has ended. Follow-up updates, direct emails, or meetings with key partners and clients should be used to inform them of any ongoing actions or changes made as a result of the crisis. This continued engagement fosters transparency and helps maintain trust. It is also an opportunity to reinforce the organization's commitment to its stakeholders and to demonstrate that it values their continued support.

Finally, after the crisis, it is essential to update and refine the crisis communication plan. This includes revising the crisis manual, improving training for spokespeople, and conducting new risk assessments. The crisis communication plan should evolve to address the lessons learned and ensure the organization is even better prepared for any future crises.

4. Essential Tools for Crisis Communication

For effective crisis communication, there is a need to combine both offline and online tools, which can help ensure a well-coordinated response and maintain trust during a crisis. Crisis Management Plan, as a crucial tool for crisis communication, outlines procedures and

responsibilities during a crisis. The purpose of crisis management planning is to evaluate the entire scenario and create flexible plans so that those involved in their implementation can understand and practice them accordingly. Thus, a crisis management plan outlines overall strategy for responding to a crisis, including decision-making, resource allocation, and operational coordination (Khodarahmi, 2009; Lando, 2014; Parsons, 1996; Sapriel, 2003).

The crisis management plan provides the strategic framework for handling the crisis and it requires the combination of many factors, including the formation of a crisis management team, the designation of a crisis spokesperson, the establishment of a crisis pressroom, the development of a crisis communication plan, and ensuring the flow of information (Parsons, 1996). In order to ensure the flow of information, a crisis communication plan - a specific subset of the crisis management plan- should be implemented.

Organizations need to evaluate the most effective tools for managing crises across different scenarios and contexts, including a crisis communication plan and the necessary communication equipment (Sapriel, 2003). Crisis communication plan focuses on how to communicate with key stakeholders, the media, and the public during a crisis. Thus, it involves activating networks, especially media networks to ensure the real-time information and to stay in constant contact with key-decision-makers. To achieve this, a member of the crisis team should act as the spokesperson, responsible for organizing regular meetings and press conferences (Saliou, 1994). Identifying and preparing spokespersons as part of the crisis response team is crucial for effective communication and decision-making during a crisis. That is why; roles and responsibilities should be clearly assigned to team members and spokespersons.

Creating messaging templates, press releases, and media kits are crucial tools for effective crisis communication, as they provide timely updates and help maintain transparency and credibility. To manage media relations and coordinate both internal and external communication, having a well-prepared communication plan is essential (Coleman, 2020). Email communication with both internal and external audiences is a reliable tool to reach both employees and stakeholders. Using an organization's official website to share relevant information, news and updates about ongoing crisis is a fundamental tool of effective crisis communication (Gainey, 2010). Additionally, Chatbots, which are software applications that interact with users, can be used for direct communication with affected individuals, providing support and information (Daimiel, & Estrella, 2021). Utilizing apps can also enhance crisis communication by helping to reduce the uncertainty experienced by those affected, although the objectives of communication can vary based on the specific context of a crisis (Karl, Rother, Nestler, 2005).

The strategic use of priority channels to provide consistent updates to media contacts and stakeholders are also important for crisis communication. Effective use of digital platforms, especially social media plays a key role in quickly and timely disseminating information. However, instead of sharing information across all digital platforms, it is necessary to identify the channels where the main target audiences are present and prioritize these platforms in the plan (Karl, Rother, Nestler, 2005; Coleman, 2020).

Social media provides various tools for media monitoring and evaluation, which are critical to the success of a crisis communication plan (Sapriel, 2003). Media monitoring tools help organizations track news and social media mentions, allowing them to evaluate the impact of

their crisis response and adjust their strategy. Social media tools and analytics, such as Google Analytics, Facebook Insights, and Twitter Analytics, as well as social listening tools like Brandwatch, Hootsuite, and Mention, can be used for this purpose. These social media tools allow organizations to monitor a crisis by tracking the spread of information, public sentiment, and the effectiveness of their communication strategies. Social media trends and social media listening can provide crisis managers with insights into the conversations surrounding the crisis (Mackey, 2015; Ruggiero, & Vos, 2014). While these tools can detect early signs of an emerging crisis and related issues, they can also be utilized to adjust crisis communication strategies based on real-time feedback. The effective use of both traditional and digital tools together will provide a structured and reliable approach to crisis management and crisis communication.

5. Crisis Communication on Social Media and Digital Environments

Social media plays a crucial role in crisis communication as it provides various platforms for interactive and extensive communication. Social media here refers to the internet-based applications such as blogs, forums, Facebook, X (formerly Twitter), Instagram, YouTube, etc., that are generally accessible for free and enable users to create and share information, allowing dialogue and two-way communication with various publics (Breakenridge, 2008; Kaplan & Haenlein, 2010; Kietzmann, et. al., 2011; Lariscy, et.al., 2009). Thus, social media provides real-time updates and engagements with the public, which allows addressing misinformation immediately.

Crisis communication on social media and digital environments involves the strategic use of social media and other digital media platforms by institutions, organizations, companies and public figures to communicate effectively during a crisis situation. Social media, social networking, and digital environments can be employed during various phases of both natural and human-made crises (Chewning, 2014; Kaufhold et al., 2019; Wetzstein et al., 2014). Since the primary objective of crisis communication is to rebuild the organization's reputation and restore the confidence among customers or stakeholders (Utz, Schultz, & Glocka, 2013), social media use in crisis management can help mitigate the situation's severity and assist the organization in regaining control.

The digital environment, especially social media platforms, has the potential to rapidly disseminate information during crisis situations, enhancing the speed and reach of crisis communication. When a negative incident occurs, social media often serves as the first point of communication. In such situations, it is crucial for organizations to provide immediate information on social media in order to address rumors, correct misinformation, and deliver regular updates, reaching a wide audience in real time (Valentini, Romenti, & Kruckeberg, 2017). Thus, the effective and timely use of social media in crisis communication will prevent the spread of misinformation and enable the public to access accurate information. Effective crisis communication strategies should include debunking false claims and rumors while directing the public to verified sources of information.

With the evolution of social media, crisis communication has shifted from a one-way to a two-way communication model, enabling organizations to engage directly with the public in digital environments. Social media enables interactive communication, allowing organizations to respond directly to questions, comments, concerns, and feedback from the public. This interaction can help diffuse negative sentiment, reassure stakeholders and clarify misunderstandings during crises (Mele, Filieri, & De Carlo, 2023). However, while social media allows organizations to quickly inform stakeholders it also results in a potential loss of message control, as social media users can create and disseminate their own interpretations of a crisis. That’s why, during crisis situations, it is essential for organizations to maintain transparent communication and act promptly to manage public perception.

Organizations can use social media to strengthen the sense of community and offer emotional support during crises. Social media also allows organizations to show empathy and acknowledge public concerns (Liu, Austin, & Jin, 2011). Social media platforms such as X (formerly Twitter), Instagram, Facebook, TikTok, and YouTube allow individuals not only to connect, but also to share experiences, and come together during a crisis, helping to foster community resilience.

Situational Crisis Communication Theory (SCCT), a framework for managing crisis communication, **systematically categorizes** crisis response strategies which organization takes after a crisis occurs. According to SCCT organizations should adapt their communication strategies based on specific characteristics of each crisis (Coombs, 1995). Strategies for apologies, transparency, image repair, or corrective action can be adapted to social media. Regarding the response strategies in literature (Benoit, 2015; Coombs, 2007, 2017; Liu et. al., 2011; Jin, Pang, & Cameron, 2012), **a coding categorization for a crisis communication on social media can be offered based on a message type, the tone, contents of the message (posts), target audience, frequency and timing, and engagement metrics.**

Table 1. Coding categories for a crisis communication on social media

Message Type	
Informational	Gives new information, facts or updates about the crises
Denial	Express that no crisis exist
Apology	Expresses regret or apologizes for the incident
Empathetic	Expresses concern for affected individuals
Defensive	Justifies or explains the organization's actions
Corrective Action	Defines steps being taken to resolve the crisis or prevent future crises
Reassurance	Tries to calm fears or concerns about the crisis
Engagement/Interaction	Responds to user comments or questions directly
Call to Action	Encourages the audience to take specific actions like safety advice, contact support
Tone	
Neutral	Factual and unemotional language
Empathetic	Expresses care, concern or sympathy
Reassuring	Provides comfort and assurance

Apologetic	Expresses regret or admits fault
Defensive	Justifies or shifts blame
Urgent	Uses urgent language to express the seriousness of the situation
Optimistic	Focuses on positive outcomes or improvements
Contents of the message (posts)	
Text-Only Message	Uses only text to deliver the message
Image Inclusion	Accompanied by a static image, visuals (like infographic, photo).
Video Inclusion	Uses video content to convey the message
Links/ Hyperlinks to Additional Information	Provides links to external resources (e.g., press releases, blog posts, web sites).
Hashtags Use	Uses hashtags to categorize or emphasize the message
Mentions/Tags	Tags specific users, organizations, or stakeholders
Target Audience	
General Public	Message intended for the broad public
Affected Individuals/Groups	Directed at those directly impacted by the crisis
Media	Addresses journalists or media outlets
Investors/Shareholders	Targets stakeholders concerned with financial aspects
Frequency and Timing	
Immediate Response	Issued within a few hours of the crisis
Follow-Up Post	Subsequent updates after the initial response
Engagement Metrics	
Number of Likes/ Reactions	Measures audience interest
Number of Shares/ Retweets	Indicates how widely the message is being disseminated
Number of Comments/ Replies	Indicates the level of engagement and audience interaction
Sentiment of Comments	General tone of the responses (positive, negative, neutral)

Source. Adapted by Matias, Türk, and Lopes based on Benoit (2015), Coombs (2007, 2017), Liu et al. (2011), and Jin, Pang, and Cameron (2012).

This coding scheme can be applied to systematically analyze social media content during crises, helping to assess the effectiveness of communication strategies used by organizations.

6. Conclusion

Crisis communication is a vital element of organizational resilience, requiring a strategic, phased approach to effectively address the challenges posed by crises. This process begins with preparation, emphasizing proactive measures such as conducting risk assessments, crafting crisis communication plans, and training dedicated response teams. Establishing clear protocols and channels of communication is essential to ensure readiness for unexpected events, as the pre-crisis phase sets the foundation for effective management, by mitigating risks and fostering a culture of preparedness. At a later stage, the crisis response phase demands transparency, timeliness, and consistency; organizations must act swiftly to issue initial statements, provide regular updates, and engage with stakeholders to prevent misinformation and confusion. Trained spokespersons play a crucial role in conveying credibility, while internal alignment ensures unified messaging, and monitoring public sentiment during this phase helps organizations address concerns and adapt strategies as the situation evolves. In the post-crisis phase, evaluations and reflective practices are essential to restoring trust and learning from experience. In fact, by sharing lessons learned and implementing preventive measures, organizations demonstrate accountability and a commitment to continuous improvement. This cycle of refinement not only enhances resilience but also informs how organizations leverage evolving tools to address future challenges more effectively.

Among these tools, social media and digital platforms have emerged as transformative elements in modern crisis communication. Offering unparalleled opportunities for real-time interaction and extensive reach, platforms such as Facebook, Instagram, Tik Tok, X (formerly Twitter), and YouTube empower organizations to disseminate information swiftly, engage directly with stakeholders, and combat misinformation. Social media fosters two-way communication, allowing organizations to respond to questions and concerns in a timely manner, thereby reinforcing trust and demonstrating a proactive approach. Furthermore, digital tools such as Google Analytics, Brandwatch, and Hootsuite empower organizations to monitor public sentiment and evaluate the impact of their communication strategies. These platforms facilitate real-time adjustments to messaging, ensuring it remains relevant and impactful, and features like hashtags, mentions, and targeted messaging enable precise audience engagement, whether directed at the general public, affected groups, or stakeholders. Despite their benefits, social media platforms also pose challenges, such as the rapid spread of misinformation and diminished message control. To navigate these complexities, organizations must adopt structured strategies, leveraging frameworks like the Situational Crisis Communication Theory (SCCT) to tailor responses to the crisis context. Maintaining transparency and acting promptly are crucial to managing public perception and preventing reputational damage.

The research also led to the development of a coding scheme designed to contribute to future academic and scientific studies on crisis communication via social media. By categorizing key message types, tones, content formats, target audiences, timing, and engagement metrics, it provides a structured framework for evaluating and enhancing communication strategies in crisis contexts.

Ultimately, the integration of traditional methods with digital tools ensures a comprehensive approach to crisis communication. By combining offline strategies - such as structured team coordination and spokesperson training -, with the immediacy and reach of social media,

organizations can enhance their ability to respond effectively. This balanced approach fosters trust, supports recovery, and builds resilience in an increasingly complex and connected global environment.

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Message Strategies of Emergency Management Organizations during Severe Weather Effects.

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Abstract. This study examined the strategy and effectiveness of social media warning messages disseminated by three Greek public organizations during severe weather events, 112.gr, the Fire Brigade (FB), and the General Secretariat for Civil Protection (GSCP) regarding severe weather phenomena in a certain timeframe. Utilizing content analysis based on the Warning Response Model (WRM), 156 messages from Twitter were analyzed. We investigated the impact of factors such as threat description, protective action guidance, the inclusion of location and timeframe information, the identification of the message source, and variations in message framing. The research concludes that there are significant variations in framing and effectiveness across the organizations. Results reveal that 112.gr, despite having the smallest follower base, achieved the highest user engagement, attributed to its emphasis on actionable instructions and location-specific information. We found out that these elements significantly enhanced engagement, as measured by favorites and retweets, underscoring the role of content clarity and relevancy in public responsiveness. This research offers critical insights for refining warning message strategies to improve public safety during severe weather, contributing to refining warning message strategies and improving public safety during severe weather events in Greece.

Keywords: Risk communication, warning messages, social media, warning strategies, protective action guidance, message elements, Early Warning Tool, WRM, Message effectiveness, Account engagement.

1. Introduction

Reuter et al. (2016, 2018) and Reuter and Kaufhold (2017) categorize social media usage during disasters into four communication channels: authority-citizen exchange, citizen self-help communities, inter-organizational crisis management, and authority evaluation of citizen-provided information. Social media platforms like Twitter can provide valuable real-time insights into public concerns during natural disasters, enabling disaster management organizations to develop more responsive and effective crisis management plans (Karami et al., 2020). However, the existing

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body of research lacks a comprehensive overview of current social media practices in disasters, limiting the ability of various groups to fully utilize these platforms (Ogie et al., 2022).

Despite these diverse applications, the primary use of social media during crises remains the acquisition and redistribution of information (Reuter et al. 2016). While studies have explored social media's role in crisis communication, very few have focused on message structure and the direct effects on engagement and user responsiveness, (Reuter & Kaufhold, 2017), particularly within the Greek context (Yli-Kauhaluoma, S., et al. 2023).

This study aims to examine warning message elements disseminated by Greek public organizations. We will also investigate the impact of these elements on user engagement and explore variations in message framing across different emergency management organizations.

2. Twitter as an Early Warning Tool

The real-time nature of Twitter and its broad reach make it a valuable tool for sending early warnings in emergency situations. Studies have shown a significant increase in the use of Twitter during natural disasters and emergencies, such as Hurricane Harvey in 2017 (Debnath et al., 2022, Berglez & Al-Saqaf, 2021). Through social networks, citizens can participate in open exchanges of views and information about climate phenomena. Social media has disrupted traditional channels of communication, such as journalists and media editors, political parties and the academic/scientific community, while increasing the ability of individuals to reach large numbers of people. This has allowed citizens to play a much larger role in shaping public discourse on issues such as climate change (Berglez & Al-Saqaf, 2021). In disaster situations, first responders and citizens sought and shared information through this tool (Ford, 2018; Roy et al., 2020).

The ability of this platform to disseminate information in real time has proven invaluable in various crises, including the Great East Japan Earthquake in 2011, where Twitter served as a reliable channel of communication amid overloaded telephone networks (Kenyi, 2022). Other research has shown that National Services use Twitter to communicate severe weather warnings and instructions for taking preventive measures in real time, which can be especially useful during rapidly evolving events such as tornadoes (Liu et al., 2019). Maps, narratives, and multimedia presentations can be powerful tools in enhancing public awareness and fostering accurate perceptions of flood risk (Bodoque, J., 2019). By engaging public bodies in networks such as Twitter, preparedness awareness efforts can be enhanced, protective action behaviors can be promoted, and dialogue through disaster messaging can be improved (MacIntyre et al., 2019). Furthermore, online platforms allow the public to engage in interactive communication to facilitate a sense of community and seek support during natural disasters (Fraustino et al., 2018). However, without dialogue, social media only functions as a one-way means of communication (Kent & Taylor, 1998).

While research highlights the significance of social media during emergencies, further investigation is needed to understand how these platforms can be most effectively utilized throughout the various phases of a crisis (Panagiotopoulos et al. 2016). The added value of this research is that accepting there is no one-size-fits-all approach to communicating uncertain risk information effectively, as Bostrom et al. (2018) noted the best method for quantitatively communicating uncertain risks is multidimensional, with few guidelines that could fit in different cases of disruptive events, we are suggesting a localized and directed review in the Greek context.

Accuracy and reliability of information during disasters is paramount, as poorly written or inaccurate messages can reduce recipients' trust in public organizations and negatively affect preventive measures (Coombs, 2010). The study by Liu et al. (2020) revealed that different types of crisis narratives in social media can shape people's emotional reactions, information-seeking strategies, and willingness to take protective measures during a crisis. Narratives that evoke sadness, such as stories of victims or heroes, may be more effective in prompting information seeking and protective actions than narratives that focus on the specific disaster. It could be argued, that certain messages get more retweets than others. Message content reference to hazard impact and hazard severity, governmental activities, or guidance for protective actions augments the possibility to be retweeted and therefore the warnings to earn the spreading effect of the dissemination of information (Sutton et al. 2015).

Trust and credibility are critical factors in the effectiveness of Twitter warnings. Reuter and Spielhofer (2017) found in a survey conducted in Europe that citizens who use social media during emergencies question the reliability of information and often believe that there is a possibility that it is fake news or exaggerated reactions by public bodies. This result highlights the need to build trust between the public and public organization accounts on Twitter. Verification of information from sources and official bodies is necessary to ensure the accuracy and reliability of warnings in emergencies. The public's perception of the reliability of information shared on social media platforms such as Twitter is also influenced by factors such as prior experience of emergency exposure, source credibility, message consistency, and the presence of supporting evidence (O'Donnell, 2023). Twitter can be leveraged to enhance situational awareness, facilitate emergency response, and strengthen public trust during crises.

Exposure and attention are critical steps of protective action decision making (Eachus & Keim, 2020). A substantial body of research on public warning systems has identified specific characteristics of warning messages that influence public perception and response. These characteristics include message content, style, context, and receiver factors. Effective warning messages that motivate timely and appropriate protective action typically incorporate five key elements: hazard, location, guidance, time, and source (Mileti & Sorensen, 1990). Specifically, an indication of the severity of the risk should always be added, such as the alert level or a description of the expected intensity of the phenomenon. Clear, specific, and practical instructions on what citizens should do to protect themselves should be provided. For example, instead of "limit travel," it could state "avoid travel unless absolutely necessary." Research showed that photographs and

geographically specific messages are popular wherever possible (Eachus & Keim, 2020), visuals such as maps showing affected areas or images depicting the hazard should be used instead of a standardized list of instructions. Effective disaster response relies heavily on precise spatial data to identify the secondary consequences of a disaster and the location of those affected (Shankaret al., 2019). Links to additional information or resources, such as websites or helplines, should be provided.

3. Warning Response Model

The theoretical underpinnings of this research are grounded in the principles of the Warning Response Model (WRM). The WRM emphasizes the inclusion of specific message elements—hazard, location, time, source, and guidance—to enhance the effectiveness of warnings in prompting protective actions (Mileti & Sorensen, 1990). As highlighted in Sutton et al. (2023), WRM serves as a valuable framework for evaluating the completeness and clarity of warning messages and offers a structured approach to crafting messages that are clear, concise, and actionable. The Warning Response Model (WRM), initially proposed by Mileti and Sorensen (1990), has emerged as a cornerstone in the field of risk communication, providing a systematic framework for the design and evaluation of effective warning messages. The WRM's efficacy in guiding the creation of messages that elicit timely and appropriate protective actions has been widely recognized and empirically supported (Olson et al., 2024).

The model's emphasis is on the inclusion of five key content categories such as hazard where the type of imminent threat must be named so the recipients start to assess their actions. Location information where it is specified who is and who is not at risk for experiencing a hazard's consequences, as well as who needs to take protective action (Wood et al., 2018). The way in which a location is described within a threat message, and the level of detail provided, can significantly enhance both the recipient's comprehension of the message and their perception of the threat's personal relevance (Olson et al. 2024). Specifically, precise location information aids individuals in determining their proximity to the hazard, thereby bolstering their confidence in the message's applicability to their situation (Doermann et al., 2021). Timing details in threat messages are vital, conveying when a hazard is expected and its duration (Mileti & Peek, 2000; Sorensen, 2004). They also guide when to take and for how long to maintain protective actions (Mileti & Sorensen, 1990), and indicate when the message itself expires (Mileti, 2018). The source indication remains an important factor that affects the message credibility and increases the chances of being followed (Bean et al., 2016) especially when acronyms and jargon are not included (Sutton & Kuligowski, 2019). Lastly, guidance that helps the public take preventive action measures is often more important than the information of the actual threat (Wood et al., 2012). Furthermore, the WRM underscores the importance of message style, advocating for clarity, specificity, consistency, accuracy, and certainty in the language used (Sutton et al., 2023). The model's comprehensive approach to message design, encompassing both content and style, has proven instrumental in

enhancing the effectiveness of warnings across a diverse range of hazards, contributing to increased public safety and preparedness.

Based on the above, the present study aims at achieving the following objectives:

1. To what extent are the messages sufficient in the presence of all the elements of the WRM?
2. Are there any variations with respect to the presence of WRM elements on posts of different emergency management organizations?
3. Do emergency management organizations differ with respect to their message effectiveness?
4. Which elements of the model are the most effective in triggering user engagement?

4. Methodology

To achieve the goals of this study, we utilized the method of content analysis of early warning messages to draw conclusions. Based on the theoretical foundations of content analysis, as described by Krippendorff (2022), a systematic approach was adopted to quantify and interpret the messages. Given the nature of early warning messages, which often require rapid dissemination and understanding, a quantitative content analysis approach was used, aligned with the framework presented by Riffe et al. (2021). This includes the development of a structured coding scheme for identifying and categorizing key elements of the message.

For the research, posts on twitter were retrieved from three Public Organizations charged with the responsibility of early warning in cases of severe weather events: the General Secretariat for Civil Protection (GSCP), the 112 Emergency number system, and the Fire Brigade (FB). Messages were collected for the period 1/9/2023 to the first semester of 2024. In the case of the FB account, the start time was 19/1/24 to 4/3/2024 as previous messages were not visible. 20 messages were collected from the PS account, 61 from the GSCP account and 75 from the 112 account. A total of 156 messages have been analyzed. It is noted that an attempt was made to collect relevant notifications of extreme weather bulletins from the National Meteorological Service (NMS), however there were no posts during the search period, and links in older posts did not lead to a result. For data collection, reposts of accounts between them and all those not related to severe weather events were excluded.

Messages were analyzed according to date of publication, presence of image or video, hashtag for location tracking, and use of mention. We also collected quantitative data to measure the engagement levels of posts such as the number of favorites, and comments. This was mainly done to evaluate the effectiveness of messages (Sutton et al. 2024; Wood et al. 2017). We also measured the number of retweets of the messages and related the with the impression score of each message. Each message was also analyzed based on Mileti and Sorensen's (1990) six basic types of warning message content that motivate people to take timely and appropriate protective action in response to a warning message, which are referred to as WRM. These types were the following:

1. Description of the threat/event (i.e., the risk) and its consequences (i.e., what is happening and how it will affect people).
2. Guidance for protective action (i.e., what to do).
3. The location and population at risk (i.e., where it is happening).
4. The time the public should start taking protective action,
5. The time protective action should be completed.
6. The sender or source of the message (i.e., who is sending the message).

This methodology allowed for a comprehensive and objective analysis of the content and effectiveness of early warning messages. The research on WRM provides valuable insights into the design of effective warning messages, especially for imminent hazards (Sutton et al. 2020, 2018, 2021).

5. Findings

Of the accounts analyzed, the Fire Brigade account was the most popular based on the number of followers (174.400 followers) followed by the Ministry of Climate Crisis and Civil Protection (99.700 followers) and the 112.gr emergency number (64.700 followers), as Figure 1 shows, during the examined period.

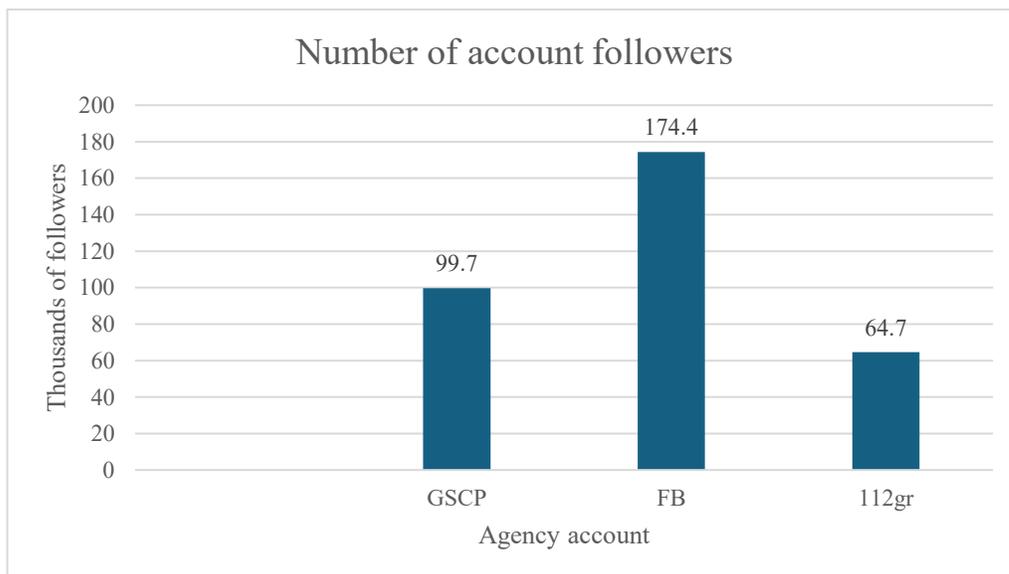


Figure 1 Number of account followers/agency

All three organizations included in most of their message’s details about the event and the possible upcoming consequences. Delving into the details of the messages, it can be argued that the 112’s account used mainly words that described the severity of the phenomena (e.g., "intense," "severe storms," "dangerous weather phenomena").

Regarding 'Guidance for protective action,' the 112gr account exhibited the highest presence at 98.67%, followed by the FB account at 23.53% and the GSCP account at 18.03%. The contrast in the inclusion of "Guidance for protective action" (FB: 23.53%, GSCP: 18.03%, 112: 98.67%) indicates a clear difference in framing.

Table 1 shows the presence of the six WRM elements across the three emergency management organizations.

	Description and consequences	Protective measures	Location and population at risk	Start time for protective action	End time for protective action	Sender source
FB	100,00%	23,53%	5,88%	35,29%	11,76%	64,71%
GSCP	95,08%	18,03%	19,67%	13,11%	8,20%	83,61%
112	100,00%	98,67%	98,67%	18,67%	16,00%	100,00%

Table 1. Categories of analysis results

112gr heavily emphasizes providing guidance, potentially framing their messages as instructional and action oriented. This pattern is also reinforced by the significantly higher number of posts in a day that is almost three times the maximum posts of the other two accounts as shown in figure 2.

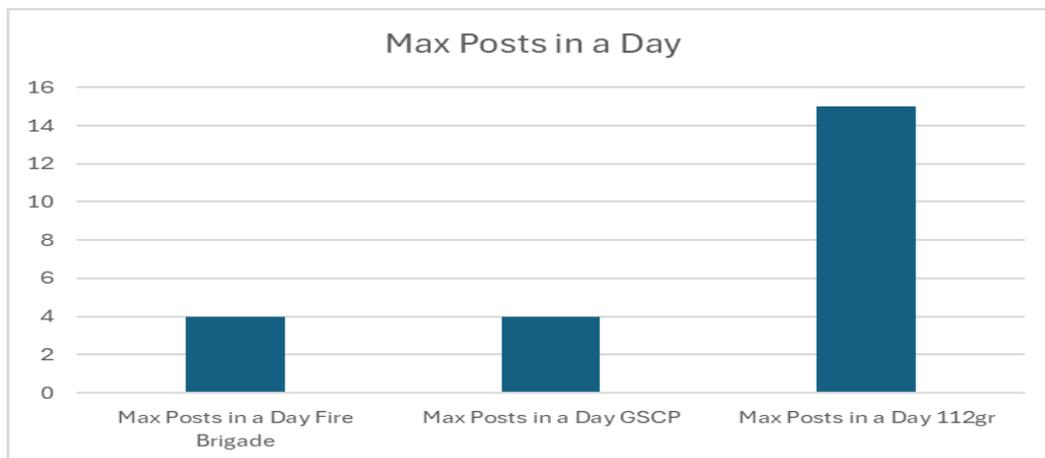


Figure 2. Number of maximum posts in one day/ agency account.

In contrast, FB and GSCP seem to prioritize other elements, focusing more on describing the threat itself or establishing their credibility as the source. Moreover, a repetition of the same instructional phrases and links was observed which suggests that the messages of 112 are largely standardized and not significantly adapted to each specific case. This finding suggests that '112' messages are likely automated or semi-automated, with the aim of quickly and effectively alerting the public in emergencies. This standardization serves the purpose of speed and clarity. Analysis of the 112 tweets revealed that guidance for protective action was consistently present in near all instances.

It was found that the Fire Brigade warning messages mainly focus on imminent or impending severe weather events ("weather deterioration," "heavy rainfall," "storms"). In addition, the words "instructions" and "protection" indicate that these messages include instructions for citizen safety.

For the third variable, 'location and population at risk,' 112gr again led with the highest percentage at 98.67%, with GSCP and FB trailing at 19.67% and 5.88%, each. It can be argued that the warnings of the 112gr specific areas, which aims to personalize the message and increase the sense of risk. At this stage we must point out that we found constant usage of capital letters and jargon in all three accounts.

The fourth element, 'the time the public should start taking protective action,' was explicitly stated in 35.29% of FB messages, 18.67% of 112gr messages, and 13.11% of GSCP messages. This finding leads to the conclusion that there is a lack of tools that could provide the exact point of the upcoming incidents.

The fifth element analyzed, 'the time the protective action should be completed,' had the lowest frequency across all accounts: 16.00% for 112gr, 8.20% for GSCP, and 11.76% for FB. This finding indicates that there the Greek agencies are not prioritizing the guidance of the finalization of the incidents, or they do not have it as a priority of the communication strategy.

Finally, regarding the identification of the message source, 112gr demonstrated 100.00% clear recognition, followed by GSCP at 83.61% and FB at 64.71%.

6. Message Effectiveness/Engagement

Regarding the engagement of the posts, Table 2. presents the mean number of favorites and retweets that posts received across the three organizations.

Agencies	Mean score of Favorites (Standard Deviation)	Mean score of Retweets (Standard Deviation)
FB	36.18 (22.24)	5.58 (4.95)
GSCP	34.01 (33.33)	13.22 (24.48)
112	77.80 (34.07)	62.12 (37.11)
F-value (sig)	33.54 (0.000)	53.42 (0.000)

Table 2. Mean scores of favorites and retweets across agencies

To test whether the three agencies differed with respect to the mean number of favorites and retweets received, two analyses-of-variance were conducted using SPSS 21.0. Results suggest that there was a significant difference at the mean number of favorites ($p < 0.05$) across the agencies. Post-hoc tests (Tukey) indicated that the 112.gr received significantly ($p < 0.05$) more favorites ($M = 77.8$) than FB ($M = 36.18$) and GSCP (34.01). FB and GSCP did not differ significantly in terms of the mean number of favorites that their posts received. With respect to retweets, significant differences were observed between the agencies ($F = 53.42$, $\text{sig} = 0.000$). Similarly, Tukey's post-hoc tests showed that the 112-account received significantly higher number of post retweets ($M = 62.12$) compared to FB's account ($M = 5.58$) and GSCP ($M = 13.22$). The posts of FB and GSCP did not differ significantly in the mean scores of retweets.

To test the effectiveness of each type of element on the number of favorites and retweet a series of independent samples t-tests. Table 3 shows the results of t-tests for the number of favorites.

	Mean scores of favorites (Standard Deviation)	t-test value	Significance
<i>Description of event</i>			
Yes	56.57 (38.98)	1.929	0.056
No	13.00 (10.58)		
<i>Protective actions</i>			
Yes	74.16 (39.49)	8.270	0.000
No	30.06 (18.94)		
<i>Location</i>			
Yes	74.94 (39.49)	8.446	0.000
No	30.37 (19.06)		
<i>Start date</i>			
Yes	62.92 (41.29)	1.080	0.282

No	54.10 (38.57)		
<i>End date</i>			
Yes	71.52 (43.52)	1.869	0.064
No	53.75 (38.07)		
<i>Sender</i>			
Yes	57.32 (39.75)	1.496	0.137
No	41.93 (30.53)		

Table3. Results of t-test for number of favorites

Based on the findings, no significant differences were observed ($p>0.05$) in the mean scores of favorites for messages that contained a description of the event ($t=1.929$, $\text{sig}=0.056$), the start ($t=1.080$, $\text{sig}=0.282$) and end date ($t=1.869$, $\text{sig}=0.064$) of the actions required as well as the source of the message ($t=1.496$, $\text{sig}=0.137$) compared to messages that did not contain these elements. On the contrary, significant differences were observed in the mean scores of favorites with regard to the use of protective actions ($t=8.270$, $\text{sig}=0.000$) and location ($t=8.446$, $\text{sig}=0.000$) in the warning messages. Specifically, messages that contained calls to protective measures and included the location of the incident received more favorites compared to posts that did not contain these elements.

Table 4 shows the results of t-tests for the number of retweets.

	Mean scores of retweets (Standard Deviation)	t-test value	Significance
<i>Description of event</i>			
Yes	36.97 (39.61)	1.394	0.166
No	5.0 (1.0)		
<i>Protective actions</i>			
Yes	56.19 (40.67)	9.093	0.000
No	8.75 (10.84)		
<i>Location</i>			
Yes	57.77 (40.39)	9.844	0.000
No	8.11 (7.75)		
<i>Start date</i>			
Yes	32.67	0.543	0.588
No	37.16		
<i>End date</i>			
Yes	38.26 (28.37)	0.198	0.137
No	36.33 (40.91)		

<i>Sender</i>			
Yes	39.22 (40.15)	2.695	0.008
No	11.68 (20.49)		

Table3 Results of t-test for number of retweets

In a similar vein with favorites, no significant differences were observed ($p > 0.05$) in the mean scores of retweets for messages that contained a description of the event ($t = 1.394$, $sig = 0.166$), the start ($t = -0.543$, $sig = 0.588$) and end date ($t = 0.198$, $sig = 0.137$) of the actions required compared to messages that did not contain these elements. On the contrary, significant differences were observed in the mean scores of retweets with regard to the use of protective actions ($t = 9.093$, $sig = 0.000$), location ($t = 9.844$, $sig = 0.000$) and sender identity ($t = 2.695$, $sig = 0.008$) in the warning messages. Specifically, messages that contained calls to protective measures and included the location of the incident and the sender identity received more retweets compared to posts that did not contain these elements.

7. Conclusions and Discussion

This study investigated the impact of warning message elements on social media engagement during severe weather events in Greece. We analyzed the presence and clarity of threat descriptions, and protective action guidance, as well as the inclusion of location at risk and timeframes for action. We also examined the impact of message source identification and variations in message framing across emergency management organizations. By evaluating these factors and the relationship between message characteristics and public engagement.

In conclusion, Twitter's real-time nature and broad reach make it a valuable tool for early warnings, capable of influencing preventive actions and activities. By analyzing messages from Greek organizations, our study contributes in the area by enriching the research. Our findings offer valuable insights into how these factors may influence public response in the Greek context.

Based on the findings almost all organizations described the event and included the sender of the message. In general, we also found that organizations do not include the end-date of the protective measures. The content analysis of the messages from the three sources (112, Fire Service, General Secretariat for Civil Protection) reveals that all agencies use clear language, even though there is a certain amount of technical jargon. This is consistent with the best practices described in the reference article, which emphasizes the importance of using common words that do not require interpretation. The messages provide basic information about the type of hazard (e.g., storms, snowfalls), which aligns with the Warning Response Model (WRM) that requires a description of the threat/event. The warnings appear to be issued in a timely manner, allowing citizens to prepare.

However, we observed several variations between the organizations. For example, the 112.gr messages included more protective measures and location as well as the population at risk. On the other hand, the account of the Fire Brigade promoted messages that included the starting time of the events. Overall, the analysis shows that '112' messages are designed to quickly alert citizens to an emergency and urge them to take immediate action, while 'Fire Brigade's' messages aim to provide more comprehensive information and guidance to help citizens prepare for and respond to the emergency. In relation to GSCP messages, we find that they focus mainly on informing about the activation of crisis units to deal with extreme weather events. In addition, the reference to "civil protection" and "climate crisis" suggests that these messages are part of a broader framework of crisis management and civil protection.

We also sought to decode differences between the organizations with respect to the users' engagement that they trigger. Results showed that 112.gr received higher levels of user engagement in terms of favorites and retweets compared to the other two organizations even though the account had the lowest number of followers than the other accounts. This could be attributed to the fact that 112.gr messages were more instructive in nature and contained the location of the event. This finding is aligned with Sutton et al., (2015) finding that messages with practical directives and localized information foster a heightened sense of personal relevance, increasing the likelihood of public engagement. For instance, messages incorporating protective actions and location details significantly outperformed others in attracting favorites ($t=8.270$, $p=0.000$ for protective actions; $t=8.446$, $p=0.000$ for location) and retweets ($t=9.093$, $p=0.000$ for protective actions; $t=9.844$, $p=0.000$ for location). It is made clear that actionable response, guidance and concrete information enhance the public's engagement irrespectively of the followers account. These elements were found to influence users' engagement (favorites and retweets). Moreover, we also found that messages that included the sender's identity triggered more virality compared to messages that did not include the source of the post. The presence of the sender's identity likely instills greater confidence in the information, driving users to share it more widely, thus amplifying message reach and impact.

In contrast, elements such as the start and end date of action did not significantly influence favorites or retweets, suggesting that temporal specifics may be less immediately engaging than protective guidance and locational cues. This may be due to users' preference for practical and location-relevant information over specific timelines in rapid-response scenarios.

Overall, our research contributes to the knowledge on effective risk communication via social media. The results of this study could be utilized to refine warning message strategies, ultimately improving public safety during severe weather events.

While this study contributes into the effectiveness of social media warning messages in Greece area, it also highlights several areas for future research. Further investigation could explore the impact of incorporating specific instructions and visual aids on protective actions within the Greek context. Examining optimal message framing strategies for severe weather events in Greece, considering risk perceptions, would also be beneficial. While this study provides valuable insights

into current practices and areas for improvement, Additionally, a bigger time frame of research into tailoring messages and understanding the effects of repeated exposure to warning messages on public trust and preparedness in Greece could further enhance our understanding of effective communication trends customized for certain public audience.

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Civil Protection Online Communication: A Comparative Analysis of European Union Member States

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Abstract. This paper focuses on the study of the online presence of Civil Protection from member states of the European Union. The purpose of this study is to examine the content presented in the webpages of civil protection organizations from several member states as well as to identify common patterns or differences in their online presence. The analysis focused on eleven (11) Civil Protection websites that had an English version. The majority of these websites had sections such as a presentation of the civil protection organization, contact information, hyperlinks to social media as well as , a section with announcements and a section on the European Civil Protection Mechanism / international relations. While on the contrary, to a lesser extent, sections with audiovisual material, information on a disaster or emergency as well as sections on volunteering and 112 were found. The results could offer a significant contribution to the understanding of the digital content that the specific websites choose to communicate, their role in disaster communication as well as to the development of approaches to improve communication through Civil Protection websites.

Keywords: Civil Protection, Website, Online Communication, Internet, Disasters, European Union

1. Introduction

People over the years have been and continue to be confronted with events that can interrupt their daily activities, cause damage (to buildings/structures, personal belongings), injuries and even death. In addition, they have a negative impact on people, communities and nations. These events can be categorized as crises, emergencies and disasters. The terms 'emergency', 'crisis' and 'disaster' have distinct meanings and vary in terms of their size, scope and duration (McEntire, 2014; Chasiotis, 2013). Each of these events requires action by government officials, businesses, non-

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profit organizations, citizens/ bystanders, and even victims and survivors themselves. Toward that goal the European Commission established the EU Civil Protection Mechanism in October 2001, in order to coordinate member states' Civil Protection Corps and to help countries in need in the EU and worldwide.

The ongoing complexity of these risks has also brought about change in the design of strategic messaging, leading to different expectations in terms of communication. Effective communication can have an impact on how people perceive and respond to risks, fostering trust between authorities, responders and the public, which is essential for better collaboration in a disaster (Tierney & Bruneau, 2007), the goal is to reduce the negative effects that could be caused (Sena & Woldemichae, 2006). New media and social media have changed communication, enabling fast, interactive, and borderless interaction. They play a crucial role in disseminating accurate and responsible information, and their use methodically and strategically can significantly minimize the impact of disasters during the mitigation, preparedness, response, and recovery phases.

The purpose of this research is to highlight the European Union Member States that have a separate Civil Protection website, to investigate the themes of the Civil Protection websites of European Union Member States that had content in English, the content of these themes and the way they are presented. In order to draw conclusions about the content they choose to communicate to the public and the differences or commonalities between them based on the content aiming to contribute to a broader understanding of how civil protection organizations implement online communication at EU level.

- How many European Union countries have separate civil protection websites and how many of them can be navigated in English?
- What is the content (type of information, similarities and differences) of the websites that are navigable in English?
- If there are sections dedicated exclusively to risk communication (e.g. disaster, crisis, emergency) and how is this done?

2. Literature Review

2.1 Civil Protection in the EU

The EU's civil protection mechanism has its roots in the early 1970s, when many European countries started to cooperate on civil protection issues. This was followed in 1987 by the creation of the Permanent Network of Civil Protection Correspondents to enable better cooperation and coordination. One of the first milestones in EU civil protection was the establishment of the European Civil Protection and Humanitarian Aid Operations (ECHO) in 1992, the department originally started as an EU humanitarian aid office, providing humanitarian assistance for more than 30 years. While in 1997, the first programs of activities of the EU Civil Protection Mechanism

were approved by the Council of the European Commission. In October 2001, the European Commission established the EU Civil Protection Mechanism, with the aim of strengthening cooperation between EU countries and the 10 participating states in the field of civil protection to improve disaster prevention, preparedness and response.. Over the years the organization has been reformed and improved to guarantee efficiency in any emergency situation. The aim of civil protection is to protect people from damage caused by disasters, while the central objective of civil protection systems at the national and EU levels is the ability to respond quickly and effectively in the event of a disaster or imminent disaster (European Commission, 2013). The main functions of the EU civil protection mechanism are: coordination and communication; resource mobilization; training and capacity building; prevention and mitigation (EU Civil Protection Mechanism, European Commission, 2024).

According to Kuipers, Boin, Bossong, and Hegemann (2015), civil security systems in Europe show great diversity in structures, policies, rules, and practices; countries are organized differently in their efforts to protect citizens from a variety of threats to their safety and security. Each is bound by different legal and constitutional frameworks (Kuipers , Boin, Bossong , & Hegemann, 2015). In addition, there is a clear trend towards "all risk" security policy systems, i.e. a risk management approach that addresses all possible risks rather than specific threats. Although civil protection systems respond to emergencies in a similar way (Dadoudi , 2017) , practices differ significantly, with countries using different laws and strategies to deal with crises.

2.2. Disaster Communication

Communication is a critical function in disaster, crisis and emergency management. The dissemination of timely and accurate information to the general public, community officials and the media plays an important role in the effective management of disaster response and recovery activities. By communicating about preparedness, prevention, and mitigation, we can encourage actions that minimize the risk of future disasters. (D. Haddow & S. Haddow, 2008). Disaster communication can be categorized according to the period of communication. 'Emergency' communication takes place during a disaster where there is a need for rapid dissemination of vital information. On the other hand, "long-term" communication takes place over an extended period before and after emergencies or disasters (Dufty, 2020). Disaster communication is the responsibility of the government and flows through various government agencies (federal, state, and/or local), ideally in a coordinated manner (Coombs W. , 2010). According to D. Haddow & S. Haddow, the mission of an effective disaster communication strategy is to provide timely and accurate information to the public in all four phases of management (Haddow & Haddow, 2014). Effective communication can have an impact on the way people perceive and respond to risks, enhance trust between authorities, responders and the public, which is essential to better cooperate in a disaster (Tierney & Bruneau, 2007), in order to reduce the negative impacts that could be caused (Sena & Woldemichae, 2006). However, there are also some challenges in communication in the different stages of managing a disaster (before, during and after an event). For example, socio-economic inequalities , which often lead to unequal access to information and resources, preventing the dissemination of preparedness measures among marginalized communities (Paton & Johnston, 2001). Data overload during a disaster from various sources , leading to information overload and creating difficulties in decision making (Dynes, 2006). And the obstruction of the

dissemination of reliable information on available resources, assistance programs and reconstruction efforts (Tierney & Bruneau, 2007).

2.3. The role of online communication in disaster management

Technologies such as laptops, mobile phones, text messaging systems, wireless networks have changed the way we communicate and the way news is gathered and distributed. All these developments have also brought about a change in disaster communication, having revolutionized the decision-making process, knowledge enrichment and communication (Karamanou & Valsamos, 2016). The internet and online platforms are increasingly used for disaster mitigation as a means of disseminating information because it is easy for people to access it. Twigg states that "the internet has brought a revolution in information for risk reduction". While, Rapisardi, Di Franco, & Giardino (2014) pointed out that the time when there is no disaster/crisis should be used to build and establish an online presence or online reputation to help people understand the phenomena and the Civil Protection intervention model (Rapisardi, Di Franco, & Giardino, 2014). In general, digital platforms are used to continuously update information, spread public awareness of disaster conditions, build communities and volunteers to manage aid, raise funds, monitor and provide knowledge about all situations that occur, including disaster status reports (Topno, 2016).

The development of a well-marked website can be a highly effective means of making the national and international presence of an organization (governmental or non-governmental) or business felt. Also, websites are used by public agencies, citizens, businesses, and non-profit organizations to collect information about disasters (Pine, 2017). According to Barrantes, Rodríguez, & Pérez (2009), the websites of disaster management or health crisis management organizations should become the preferred reference point for those seeking reports and analyses about the disaster or emergency, the needs of the affected population, and the progress being made to address the situation (Barrantes, Rodríguez, & Pérez, 2009). While Twigg (2004) stresses that a website that includes information on disaster plans certainly helps in managing the consequences of a disaster (Twigg, 2004). In addition, government and non-profit organizations use the internet not only for forecasting and warning, but also as channels for educating the public, providing a wide range of general and specific advice on risk reduction (Twigg, 2004). Such websites could provide a more efficient and effective option for the rapid, planned and global dissemination of disaster information. Their application is shaped by the context, the users and the nature of the crisis (Singh & Singh, 2022).

Another online communication channel is social media, which plays an important role as a disaster communication tool (Houston et al., 2014). According to Houston, Hawthorne, Perreault, & Park the potential users of social media in a disaster are: (i) individuals, (ii) communities, (iii) organizations, (iv) governments, and (v) news media (Houston, Hawthorne, Perreault, & Park, 2014). The use of social media can be categorized into 2 categories: 1) Passive dissemination of information, i.e. personal communication, and 2) Systematic use as a tool in disaster management, which defines that social media will be indirectly influenced by how the prevention team operates and the community's behavior in an emergency (Sutton, Shklovski, & Palen, 2008). Their application in each phase of a disaster (before, during and after) is different.

3. Methodology

3.1. Method of data analysis

The method of data analysis was content analysis, which was used to analyze the information available on each website (webpage) in order to classify this information into categories. Content analysis was applied in this research to investigate the official websites (websites that have navigation in English) of the Civil Protection in EU countries; comparative analysis was used to analyze the main menu bar topics available on each website (webpage) and the individual characteristics of these topics. The use of the comparative analysis led to the extraction of quantitative results, in relation to the Civil Protection websites.

3.2. Research definition - Coding of data

The aim of the study was to analyze the websites of Civil Protection organizations in the member states, identify the main themes in the websites and compare them to reveal common patterns or differences across the member states.

The study focused on the analysis of websites over the time period 2023-2024. In order to determine which EU member states had a website in English, a list of 27 countries of the European Union was first created. The search was initially carried out through the Google search engine, using keywords such as civil protection plus the name of a country or civil protection/defense plus the name of the country or civil protection website plus the name of a country. Afterwards, an equal internet search was carried out through the official website of the European Union Civil Protection and more specifically in the section (What we do Civil Protection The national disaster management system) where both general information and a short presentation of each civil protection and contact information including links related to the civil protection of each country were found. After completing the recording of the data that resulted from this search, another search was made through the portal "Division of Powers", this portal contains the results of the descriptive study carried out by "The London School of Economics and Political Science (LSE)", "CASE - Center for Social and Economic Research" and "The Centre for Strategy & Evaluation Services (CSES)", and presents in a simple and understandable form information concerning the Member States of the EU. EU Member States, including information on Civil Protection (presentation of the organization and useful links to it). Finally, on completion of the recording of these results, a comparison of the results found in these three ways was made in order to make a final selection of the websites on which the study would be carried out. More specifically, 11 EU member states were found that had a Civil Protection website in English and were used for further analysis, the member states and the links for their Civil Protection websites are as follows:

	EU Members	Civil Protection Websites
1	Belgium	https://www.civilsecurity.be/en
2	Germany	https://www.bbk.bund.de/EN/Home/home_node.html
3	Danish	https://www.brs.dk/en/
4	Republic of Ireland	https://www.civildefence.ie/
5	Cyprus	https://civildefence.com.cy
6	Malta	https://mhascms.gov.mt
7	Portugal	http://www.prociv.pt/en-us/Pages/default.aspx
8	Sweedden	https://www.msb.se/en/
9	Czech Republic	https://www.hzscr.cz/hasicien/
10	Italy	https://www.protezionecivile.it/en/
11	Greece	https://civilprotection.gov.gr/en

Table 1 : EU member states that have a website in English and their links

For each website the titles of the main menu as well as of the subsections were recorded. This resulted in a list of evaluation criteria that was used to examine and compare the websites. The evaluation criteria were as follows:

Assessment criteria	Individual characteristics	
Presentation of civil protection policy	Categories - Method of presentation	Aim/Purpose
		Organization chart
		Presentation of the Administration
Contact information	Categories of contact information	Contact (phone numbers)
		Address
		E-mail
		Contact form
		Map
	Presentation method	Separate section
		Only on the home page
Included in the section about us		
Separate section & Home page		
Information available on natural disasters (in English)	Section with information on natural disasters	They have one such section
		They do not have such a section
	Categories of natural disasters	Fires
		Floods
		Severe weather events
		Earthquakes
		Landslides
		Volcanic eruption
		Tsunami
News/Announcements - Press releases	Section with News/Announcements - Press Releases	Available in English
		Do not have any
		Available but not regularly updated
Content of announcements	The analysis is approximate	
112 number	Detailed information about 112 (in English)	Do they have a section or general information on 112 within the website?

		No, i.e. no reference is made to 112
What is the most common social media	Which social media do they have Number of followers	Facebook
		Twitter
		Instagram
		Youtube
	The way they place the links of social media	Separate section
		Only on the home page
		Included in the section about us
		Separate section - home page
Audiovisual content	Separate section with audiovisual material	They have a section
		Do not have a section
	Content of audiovisual material available	Video
		Images
		Content
Volunteering	Section on volunteering	They have a section
		Do not have a section
Website accessibility	Websites that had a feature that made the site more easily accessible to people with disabilities	They have a section
		Do not have a section
	A section referring to the European Civil Protection Mechanism	They have a section

European Civil Protection Mechanism - International missions	and the international missions of each organisation	Do not have a section
Change in the content of web pages	Change in content when switching from English to the national language of the country concerned	Changes the content
		Does not change the content
FAQ	Websites that featured instrument content A list of frequently asked questions (FAQ)	Apply
		Not apply

Table 2: Evaluation criteria - Individual features

4. Results

4.1. Civil Protection websites in EU Member States (Websites)

The EU Civil Protection Mechanism consists of 37 countries in total: 27 EU Member States and 10 participating States (Albania, Bosnia and Herzegovina, Albania, Bosnia and Herzegovina, Iceland, Moldova, Montenegro, North Macedonia, Norway, Serbia, Iceland, Turkey and Ukraine). This research focuses on the 27 EU Member States and more specifically on the EU countries that have a Civil Protection website in English, 17 of the 27 countries have a separate Civil Protection website, while the remaining 10 have either integrated a civil protection section in the Ministry of Interior or the website is shared with that of the fire service (Table 4). Of the 17 countries that have a website, 11 of them have a website in English as well (Table 3).

They have a website in English	Do not have a website in English
1. Belgium	1. Bulgaria
2. Germany	2. France
3. Danish	3. Spain

4. Republic of Ireland	4. Romania
5. Italy	5. Croatia
6. Cyprus	6. Hungary
7. Malta	
8. Portugal	
9. Sweden	
10. Czech Republic	
11. Greece	

Table 3: EU Member States with a separate Civil Protection website

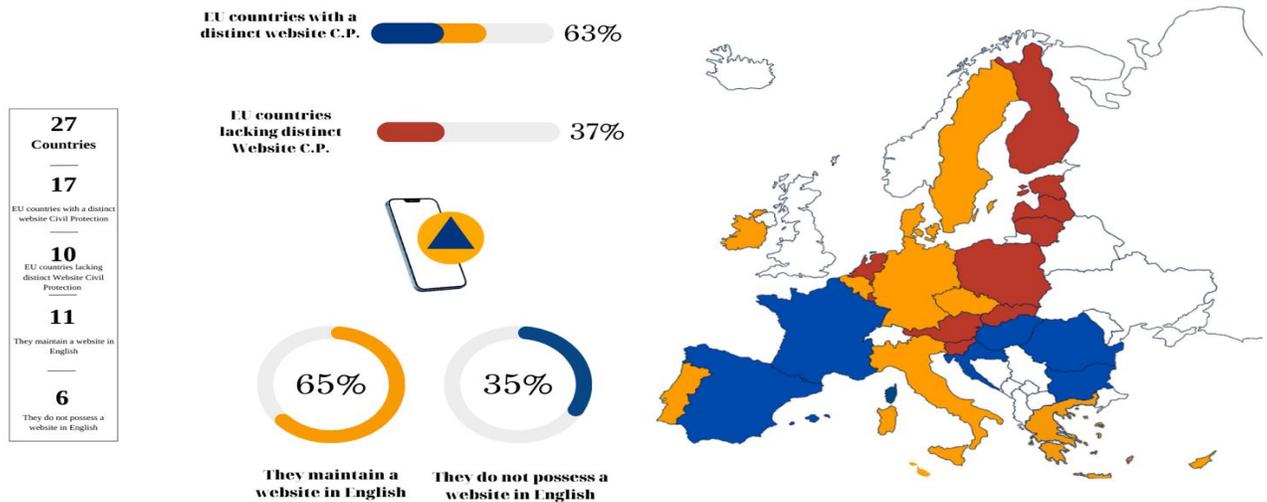


Figure 6: Overview map of civil protection websites in EU Member States

The table 7 shows which countries do not have a separate civil protection website, and which government and agency websites have a civil protection-related content.

EU Members	Comments
Austria	Section within the website of the Ministry of Interior
Estonia	Civil protection section within the website of the fire service
Latvia	Common page with the fire service
Lithuania	Common page with the fire service
Luxemburg	Section within the website of the Ministry of the Interior
Netherlands	Section within the website of the Ministry of the Interior
Poland	Civil protection and fire service module within the government website
Slovakia	Section within the Home Office website
Slovenia	Section within the website of the Ministry of the Interior
Finland	Section within the Home Office website

Table 4: EU member states that do not have a separate Civil Protection website

The analysis showed that the primary objective of most websites was to communicate information about the civil protection organization of the country, as all the websites (100%) had a section on the presentation of the civil protection organization (About Us). The majority of the information was focused on presenting the purpose of the organization while some included a short history. Few websites reported information on the administrative structure (45%) and the presentation of the management team (36%).

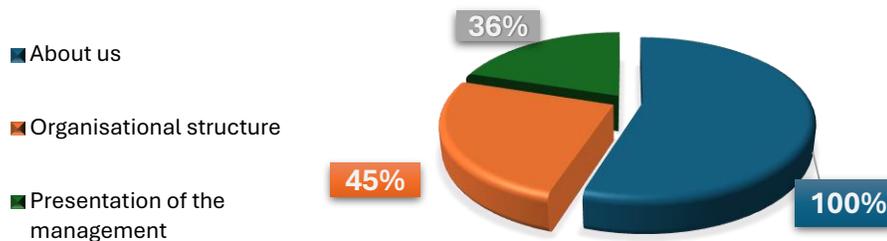


Figure 7 Presentation of civil protection (Organization Chart - Objective/Purpose -

Our mission

The MSB is responsible for issues concerning civil protection, public safety, emergency management and civil defence as long as no other authority has responsibility. Responsibility refers to measures taken before, during and after an emergency or crisis.

We work

- via knowledge enhancement, support, training, exercises, regulation, supervision and our own operations
- in close cooperation with the municipalities, county councils, other authorities, the private sector and various organisations
- to achieve greater security and safety at all levels of society, from local to global

Instructions specify the MSB's responsibilities and tasks

The Swedish Government steers the MSB via a body of instructions and an annual appropriation. The instructions specify the MSB's responsibilities and tasks. The appropriation specifies the objectives and reporting requirements, as well as the resources allocated for MSB administration and MSB activities.

About us

The Danish Emergency Management Agency (DEMA) is a governmental agency under the Ministry of Defence. We work to prepare society for, prevent and respond to crises, accidents and disasters.

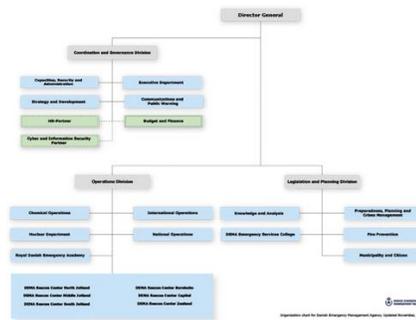


Image 1: Example About Us sections presenting the Mission - Organization Chart. Source: www.msb.se, www.brs.dk

Minister for Civil Protection and Sea Policies



Nello Musumeci is the Italian Minister for Civil Protection and Sea Policies. Nello Musumeci has served twice as President of the Province of Catania, European deputy for three terms and, until last September, President of the Sicilian Region. In the field of civil protection, Minister Musumeci served as Government Commissioner for the volcanic emergency on Etna in 2001 and was appointed as Commissioner for reconstruction the following year. He has served as delegate for the water crisis in the Province of Palermo, for the sea storms on the island of Salina, for toxic gases on the island of Vulcano, and, for the past five years, as Commissioner of the national government for the hydrogeological instability in Sicily. On October 22, 2022, he took the oath as minister in the hands of President of the Republic Sergio Mattarella.

Image 2: Example of presentation Civil Protection administration. Source: www.protezionecivile.gov.it

It could be noted that a majority of websites had a section about the European Mechanism and International Relations (73%). This content presented the European Mechanism or the international missions of the respective civil protection mechanism.

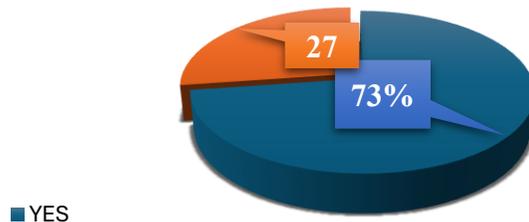


Figure 8: Civil Protection organizations which have a section on international relations – information on the Civil Protection European mechanism

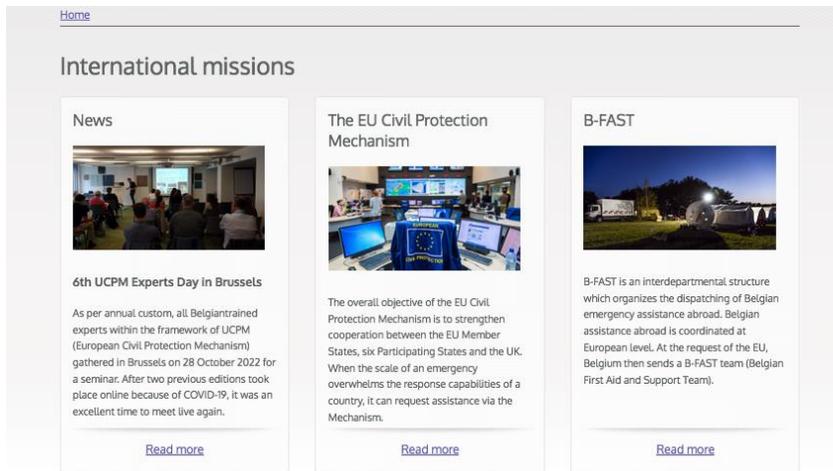


Image 3: Example of a topic for international relations. Source: <https://www.civieleveiligheid.be/en>

Another theme that all websites have is the one related to contact information. The majority of these 91% have the most basic contact information, such as phone numbers, address, and email. However, there are also websites that provide additional ways of contact; more specifically, 45% of the websites choose to allow the visitor to contact them through a contact form, as well as incorporating a map with the location of the headquarters of the civil protection office.

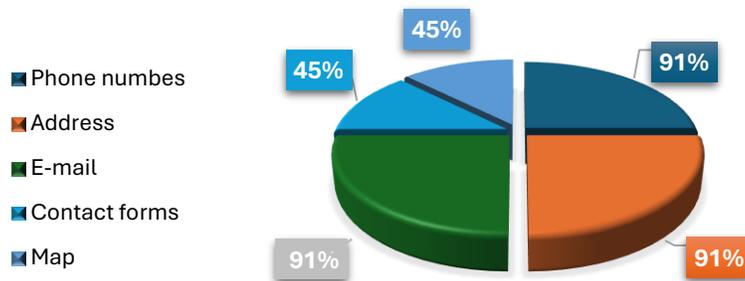


Figure 9: Categories of Contact Information

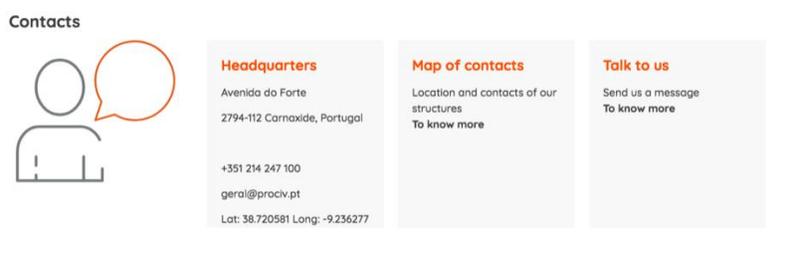


Image 4: Example sections with information. Source: <https://prociv.gov.pt/en/home/>

The majority of them presented this information on the home page as well as in a separate section(contact). And, also the high percentage of websites that had hyperlinks for social media or a relevant section, as only 2 out of 11 did not have hyperlinks for them on their website, while those that do mostly place them on the home page.

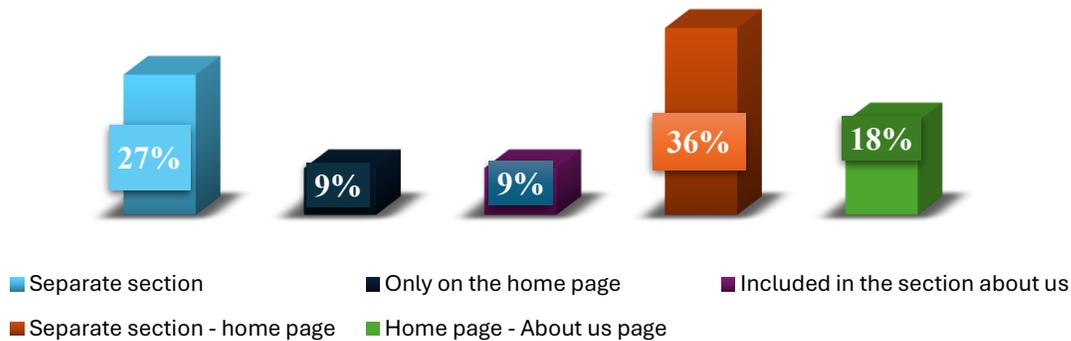


Figure 10: Placing contact information on the website



Image 5: Example of displaying contact information on the home page. Source: <https://civildefence.com.cy/en/>

As regards social media, it can be observed that the main tool used by civil protection organizations is Twitter (80%), followed by Youtube and Facebook where 7 out of 11 websites (64%) have an active account on these platforms, while fewer organizations use Instagram. The Italian website has a separate section on social media, giving information on how the Italian Civil Protection Agency uses social media and the social media it uses. Finally, it is also worth mentioning that the Danish and Czech websites have links to social media in their local language versions, while neither has a link in its English version.

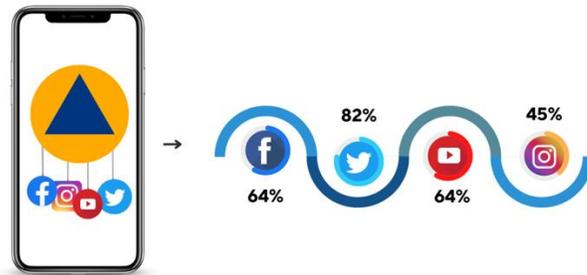


Image 6: Social media used by Civil Protection organizations.

As far as how each website chooses to place their social media links is different. The 67% of sites place them *on the home page*, either at the top before the menu or at the bottom of the page. While the Swedish website places them on the home page and also in a sub-section included in the "About Us" section. In a similar way they are also placed on the Italian website as the visitor finds them both on the homepage and in a separate section dedicated to social media.

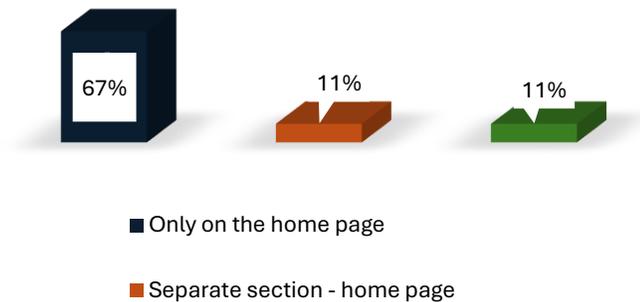


Figure 11: Where they put the social media links on their website

The next theme that most of the websites included was news/announcements. These news were related to actions undertaken by the respective organization. While their content was quite common across member states there was a difference in the rate of renewal of the posts, with 3 out of 8 not having renewed the content for more than six months (Fig. 10).



Figure 12: Which have a News/Announcement - Press Releases section

Communication by using audiovisual materials was not the main option of the examined websites. Only 3 out of the 7 websites that had this section provided rich content, which was mainly related to actions and activities of the respective organization (Fig. 12). In particular, on the German civil protection website the videos show how the civil protection (Germany) manages an emergency or disaster and how stakeholders work together, thus trying to promote more how civil protection works and emphasise its importance. Also such videos could be addressed to regional organizations involved in disaster response and how they could be better prepared for an emergency. The Italian Civil Protection website through its videos tries to promote the value and usefulness of the organization as well as the importance of preparedness, the videos are related to civil protection actions such as responding to a volcano eruption or participating in an event. Finally, only the civil protection website of Greece has videos with protection instructions, thus highlighting the importance of being prepared, the adverse effects that a disaster can cause. In addition, such videos aim to promote preparedness and how to react in the event of a disaster or emergency.

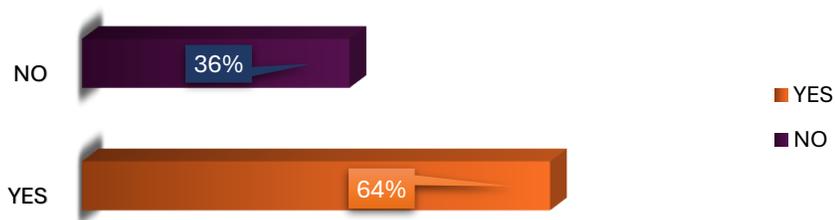
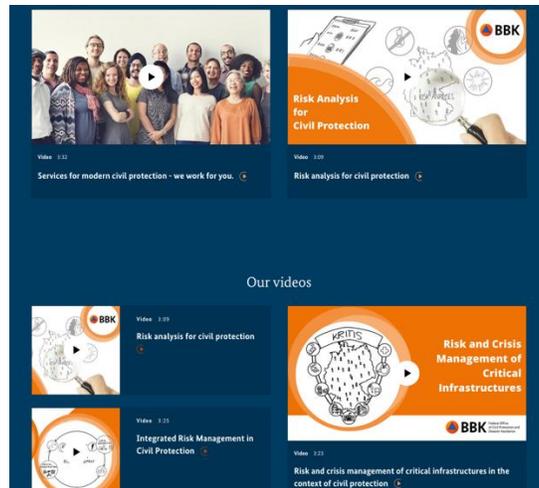


Figure 13: Websites that have a separate section with audio-visual material



Εικόνα 7 Example of a video theme & type of video it has. Source: https://www.bbk.bund.de/EN/Home/home_node.html

The table 5 shows the countries that have a section or any visual material on the website as well as the content that is communicated through this audiovisual material.

Countries	Content
Germany	<p>The topics of the videos are the following:</p> <ul style="list-style-type: none"> - How civil protection does risk analysis - The purpose of civil protection in Germany. - Questions to the National Contact Point for the Sendai Framework Germany - The Sendai Contact Point (Sendai Contact Point - German Civil Protection Agency) - The Sendai Contact Point (Sendai Contact Point - German Civil Protection Agency). - Integrated risk management in civil protection <p>In addition, the possibility is given to search in two ways by subject and by format. All videos available on the website are in English. In addition to the videos there are also additional topics given in PDF format. Finally, additional videos can be searched on the civil protection YouTube channel, with the majority of the videos being in German.</p>
	<p>In addition to videos, photos are included. It is possible to search by date, by subject (e.g. training, volunteering, emergency), by region (international and local) and by risk, while the videos are in Italian without the</p>

Italy	<p>possibility of subtitles. The content of this specific section concerns:</p> <ul style="list-style-type: none"> - Actions/conferences (speeches) of the Italian civil protection - From civil protection training exercises. - Missions of polar protection in earthquakes, fires and other natural and catastrophic events. <p>The videos are also available on the Civil Protection channel on Youtube.</p>
Republic of Ireland	There are only photo albums concerning civil protection actions, events and training exercises
Malta	<p>There is just one video on the volunteers There are photos with the following themes:</p> <ul style="list-style-type: none"> - Fleet (A short presentation) - A short presentation of a small story. <p>Photos from operations and events of the civil protection of Malta</p>
Belgium	<p>Includes photos from polar protection actions, events and training exercises</p> <p>Just one video showing a training exercise</p>
Portugal	Photos from operations, training exercises and general civil protection photos
Greece	Videos with English subtitles relating to a natural disaster or crisis with ways to protect and raise public awareness

Table 5: Content type of module with audio-visual material

Providing information on disasters, emergencies or some other risk did not seem to be the main priority for the respective websites as only 3 websites (Greece, Italy and Germany) had a separate section with comprehensive information on disasters or other emergencies. Whereas, the websites that do not have a natural disaster theme provide information on specific emergencies, for example, protecting forests and rural villages (e.g. Portugal), transporting commercial goods (e.g. Sweden), preparing for winter (e.g. Northern Ireland).

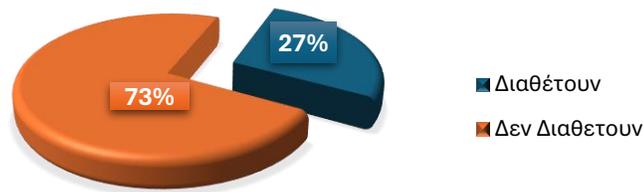


Figure 14: Websites that have thematic information on natural disasters in English

Figure (10) shows the categories of natural disasters for which information is provided in English. Specifically, the natural disasters for which information is provided are: fires, floods and severe weather events where all three websites provide information - instructions for these disasters, while only the website of the Italian MS has information - instructions for tsunamis.

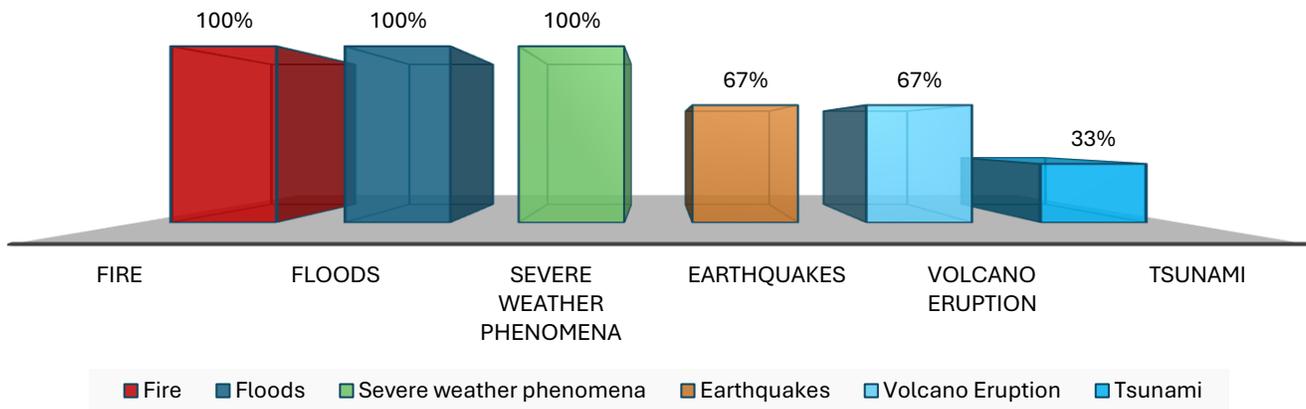


Figure 15: Categories of natural disasters

The Table 6 includes countries that do not have a separate section providing information on disasters, emergencies or other risks. It also lists the information related to a disaster or emergency that was identified within these websites.

Countries	Information about a disaster or emergency or other danger
Belgium	No Information

Danish	How are public warnings made in the event of an emergency	Fire Prevention
Republic of Ireland	Link to website related to winter protection	
Cyprus	It provides instructions in PDF format but in Greek	
Malta	No Information	
Portugal	Programs for protection and awareness in specific topics	<ul style="list-style-type: none"> • International framework for risk reduction. • Describes emergency planning • Message alert system (SMS) to the public
Sweden	Information on the transport of hazardous materials	
Czech Republic	Topics related to the protection of citizens in an emergency are analyzed, without giving instructions or methods of protection	

Table 6: Information about a disaster or emergency or some other risk from websites that do not have a relevant separate section

Only 4 out of 11 (36%) websites have a section containing information about 112, which generally covers the purpose of the number (112), how to call it and how it works in each country. The rest (64%) have no section, except for Cyprus, which has a section on 112 but not in English. Finally, the Portuguese Civil Protection website has a reference to a section on the home page. The only section available on the Croatian Civil Protection website in English is about 112.

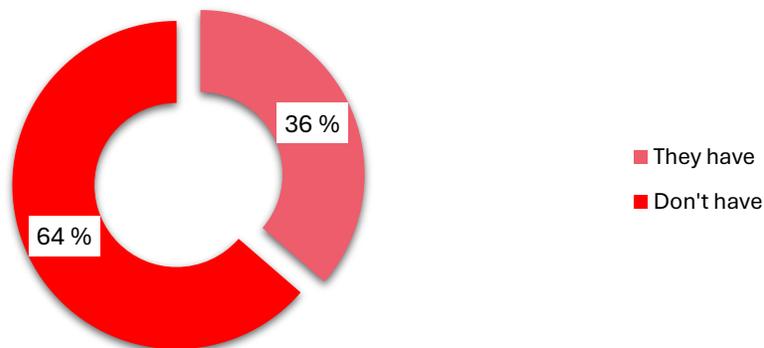


Figure 16: Information about number 112

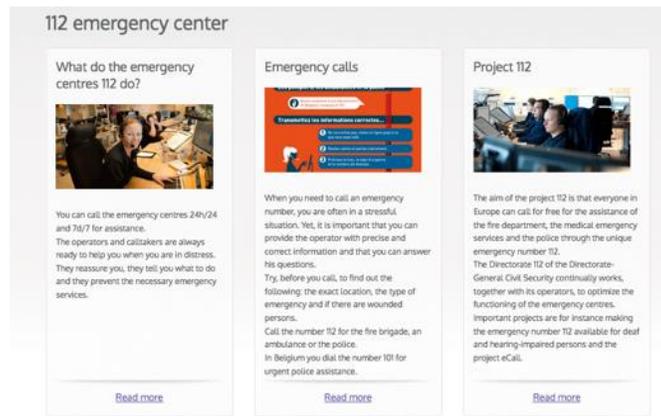


Image 8: Example of an integrated theme for article 112. Source: <https://www.civieleveiligheid.be/en>

Regarding the volunteerism, all of the websites had a short introduction on the role of the volunteer, there were some differences in the presentation of this piece of information. For example, some websites presented the role and importance of volunteering while provided the opportunity to apply for membership of the department.

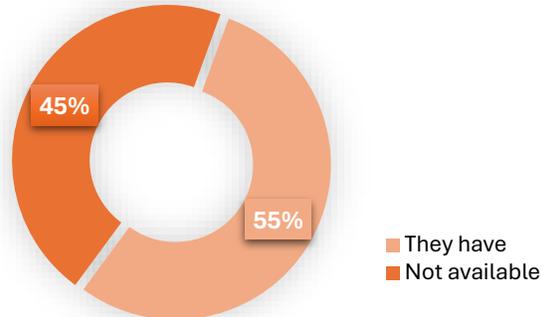


Figure 17: Civil Protection Organizations that have a volunteering theme

Changing content based on the language was shown to be a choice of most organizations (Fig. 16). It can be argued that organizations tailor the content they communicate based on the audience they are targeting.

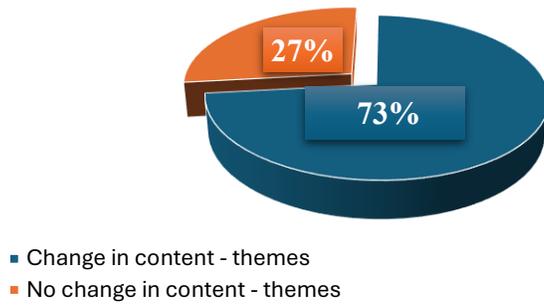


Figure 18: Civil Protection Organizations which changes content/topics after language switch



Image 9: Example of themes when the language of choice is English. Source: <https://www.brs.dk/en/>



Image 10: Themes when the navigation language is the national language of the country. Source: <https://www.brs.dk/en/>

Only three civil protection websites had an accessibility tool (for people with special needs). For example, the website of the Swedish Civil Protection, which allows the automatic reading of the text, the Malta website which features zooming in and out, in the text of website and also the civil protection website of Greece which has a complete tool of this type.



Image 11: Example of accessibility features

5. Conclusion

The aim of this study was to examine the online presence of civil protection organizations across the European member states. Image 15 presents a summary of the results. In conclusion, the online communication of the organizations seemed to be primarily focused on the presentation of the organization, answering questions such as Who, What, How and When about the Civil Protection Organization. Moreover, all the organizations present their contact details and most of them promote their social media accounts via their page in order to foster interaction with citizens. In addition, many organizations communicate their news/announcements so as to keep their citizens

updated. It could be argued that the inclusion of the news section could serve as a tool for media and press relations between the organization and journalists.

Interestingly, the promotion of the European Civil Protection Mechanism was a main communication goal in almost 70% of the websites suggesting the critical role in disaster coordination that the mechanism plays and the importance that is placed to the mechanism by the European member states. The websites analyzed also incorporate audiovisual material to communicate their actions in a vivid and rich manner aiming at fostering the understanding of citizens about the role of the civil protection organization.

On the contrary, less emphasis is placed on the 112 emergency number (36%) and on providing information on natural or technological disasters (27%). Move over, results suggest that vulnerable groups are not considered as target groups of the online communication of the civil protection organizations as few countries had accessibility options. In any case, a more inclusive online communication is needed that will take into account various crisis groups.

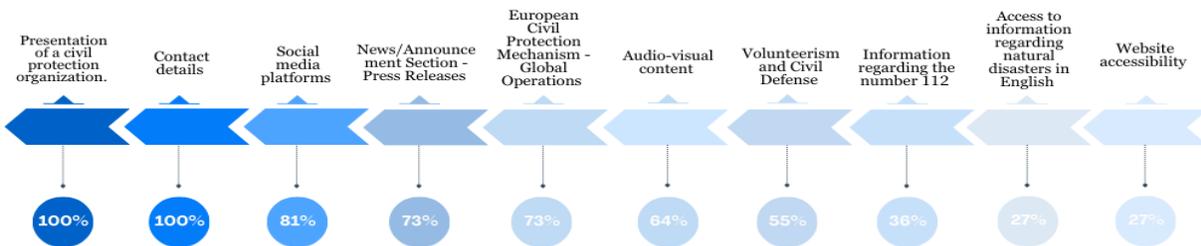


Image 15: Themes and frequency found on each website

Image 16 shows the results of the analysis by theme and country. Based on the findings, The most comprehensive websites according to the criteria of the present research were the websites of Italy and Greece, which had comprehensive sections on both the civil protection organization and topics focusing on information about disasters and crises. While , of the two, the Greek website appeared to be the most comprehensive as the only section it did not have was that of Greece, while the Italian website did not have any sections on the 112 number nor any accessibility tool. Countries with a low number of topics, such as Belgium, the Czech Republic, Malta, Denmark, choose to focus on content related to the Civil Protection Agency of the respective country and presented some minimal topics for information about disasters or an emergency.

	Presentation of a civil protection organization	Contact details	Social media platforms	News/Announcement Section - Press Releases	European Civil Protection Mechanism - Global Operations	Audiovisual material	Volunteerism and Civil Defense	Information regarding the number 112	Access to information regarding natural disasters in English	Website accessibility	FAQ
Italy	●	●	●	●	●	●	●	○	●	○	●
Germany	●	●	●	○	○	●	○	○	●	○	●
Sweden	●	●	●	●	●	○	●	○	○	●	●
Denmark	●	●	○	○	●	○	○	●	○	○	○
Portugal	●	●	●	●	●	●	○	○	○	○	○
Belgium	●	●	●	●	●	●	○	●	○	○	○
Ireland	●	●	●	●	○	●	●	○	○	○	●
Czechia	●	●	○	●	○	○	○	●	○	●	○
Cyprus	●	●	●	○	●	○	●	○	○	○	○
Malta	●	●	●	●	●	●	●	○	○	○	○
Greece	●	●	●	●	●	●	●	●	●	●	○

Image 16: The topics incorporated by each website, based on the criteria of this research

Since civil protection organizations are public bodies that aim to strengthen prevention, preparedness and response in case of disasters, their online presence should be effective and complete. The information and the way in which this information is communicated should be determined according to the needs of the target audience (users). Based on this, some suggestions will be made to improve and strengthen the collective capacity in online communication:

- I. All websites should have information about the **number 112**, for this reason a framework could be defined by the EU. with the information that this section should have.
- II. **Update the information** on the website as regularly as possible and place the date of the update to strengthen their reliability. As several topics on several websites were out of date.
- III. **A new publication policy** to develop more effective ways of communicating with stakeholders could be to enhance audiovisual material (videos, photos, graphics) that are disaster or emergency oriented and useful information about with P.P. Informational campaigns or disaster information could be added to it to enhance the user's knowledge and experience of disasters.
- IV. **Disaster Preparedness and Education**, more attention could be given to the provision of information about a natural disaster or other risk, as it emerged from the evaluation that only two websites have such a comprehensive thematic. For example, information on country-specific risks (eg floods, earthquakes, fires) and guidance on creating emergency plans for individuals, families and businesses could be provided.
- V. Incorporating **accessibility tools** so that information can be available to as many visitors as possible.

- VI. **News / Announcements** that include information - announcements about some ongoing crisis. In addition to reports on the activities of each PP.
- VII. The creation of a **common framework** with the sections that a Civil Protection website should have. in a European Union country when navigating in English. As most of the countries have different content when switching language.

Future research could shed light on the use of social media by civil protection agencies in European Member States. The effectiveness of digital communication during specific types of crises, such as natural disasters, public health crises or accidents caused by accidents or other crises. The role of mobile applications and text alerts used by EU Member States to provide civil protection information and warnings in the online communication. As well as, on public perception of online civil protection communication in EU Member States and how public trust or lack of trust affects effective online communication.

The study is limited by its focus on a small number of EU member states and a specific set of online communication platforms. While the findings provide valuable insights into the comparative effectiveness of civil protection communication, they may not be generalizable across all EU member states or civil protection agencies.

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Social media and personnel resilience: Insights from the 2020 refugee crisis in Greece

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Abstract. The escalation of armed conflicts and economic instability has led to a significant surge in migration and refugee movements. Crisis communication via social media platforms and networking sites can significantly influence the perceptions of personnel directly involved in crisis management, such as security forces. Most research on crisis communication through social media focuses on the experiences of migrants and refugees, leaving the perspectives of security personnel relatively underexplored. The present study examines the impact of posts and messages received on security personnel's social media accounts on their organizational behavior. Specifically, it investigates how online social support and organizational identification contribute to enhancing employee resilience during the 2020 refugee crisis that unfolded along the southeastern EU borders, particularly in the Evros region. A structured questionnaire was administered to 237 Greek security personnel directly involved in border patrol operations. By analyzing the effects of social media interactions, this research aims to shed light on the mechanisms that help security personnel maintain resilience under challenging conditions. The findings underscore the critical role of online social support and organizational identification in strengthening resilience. The study also outlines both theoretical and practical implications and offers recommendations for future research.

Keywords: *Social Media, Refugee Crisis, Greece.*

1. Introduction

In a volatile geopolitical environment marked by escalating conflicts and economic uncertainty, migration flows remain a high priority on the European Union's agenda. Security personnel are operating under challenging, and sometimes divisive, conditions to secure Europe's borders (Stockemer et al., 2020). In these situations, social media often serves as a platform for public expression—whether in support of or opposition to these efforts—which can influence the

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perceptions of those involved. Therefore, it is crucial for public organizations, which bear the brunt of managing refugee crises, to develop and sustain resilience, particularly for employees working on the front lines. Despite the critical role of security forces in managing these crises, the perspectives of security personnel are underrepresented in the literature, with the majority of studies focusing on the experiences of refugees and immigrants.

According to the literature, employees are the backbone of any organization, significantly contributing to its success and sustainability. Employee resilience acts as a catalyst for organizational efficiency, cohesion, and long-term viability by enhancing satisfaction, commitment, and engagement (Cooke et al., 2019; Shin et al., 2012; Youssef & Luthans, 2007). Resilience, as a psychological asset, increases employees' ability to buffer against volatile situations and mitigate stressors (Fredrickson et al., 2008). From an organizational perspective, resilience facilitates adaptability, enabling better management of resources during unpredictable work-related challenges (Stoverink et al., 2020). Employee resilience can be influenced by both internal and external factors, including leadership and social support (Cooke et al., 2019; Lee et al., 2019; Yang & Lee, 2023). This becomes especially critical in times of refugee crises, where public organizations play a pivotal role in managing evolving situations.

When public service employees face prolonged exposure to challenging situations, the resulting stress can negatively impact their emotional stability (Mao et al., 2022). However, social support from public opinion can be beneficial in reducing stress and enhancing resilience (Zhao et al., 2021). Social networking sites play a decisive role in expressing this support, which can either protect or degrade the public image and external prestige of the involved public organization (Zhou et al., 2022). Security personnel, in particular, may confront ethical dilemmas, high stress, and public scrutiny (Walsh, 2019). The interaction, both physical and social mediated, between employees and stakeholders can strengthen their affiliation with the organization, especially when employees feel they are contributing to creating value in the community (Bose et al., 2020). Moreover, organizational identification acts as a psychological anchor during crises, helping individuals stay focused and committed despite the challenges they face (Jaspal & Nerlich, 2020). High levels of identification are associated with enhanced resilience, which promotes organizational goals and fosters a robust and supportive work environment (Peng et al., 2023).

Our study focuses on the refugee crisis that unfolded during February - March of 2020 in the Evros region. Large groups of migrants residing in Turkey, an officially recognized safe state, read online posts falsely claiming that the Greek-Turkish borders would be open, and that anyone wishing to enter an EU member state could approach the Kastanies area and cross into Greece via local customs (İşleyen & Karadağ, 2023). Additionally, tourist buses were departing from various Turkish cities near the western borders with Greece (Kotoulas & Pusztai, 2020). This type of fake news, circulating on social media platforms and websites, led to the mass mobilization of thousands of individuals to the border, where they repeatedly attempted to cross into Greece. In response, the Greek government mobilized security forces (armed forces, police, border patrol, and healthcare personnel) to prevent irregular immigration flows and to inform EU member states about the situation in the Evros region (Kotoulas & Pusztai, 2020). The situation gradually de-

escalated with the emergence of COVID-19 in late March 2020 and the steadfast stance of the Greek government back by the European Union, along with the security forces responsible for managing the crisis (Kotoulas & Pusztai, 2020).

While existing literature suggests that resilience can be influenced by external social support and the level of employees' organizational identification, empirical evidence in the context of public organizations, especially within security forces, is scarce (Kanapeckaitė & Bagdžiūnienė, 2024). Our study aims to address the gap by shedding light on the mechanisms that influence the resilience of security personnel during a refugee crisis. Specifically, this research explores the impact of online social support on the resilience of security personnel, as well as the mediating role of organizational identification, in the context of the 2020 refugee crisis unfolded at the Evros border between Greece and Turkey. To achieve this, we gathered insights from security personnel directly involved in the crisis management process, examining how their interactions with their social environment via social media shaped their perceptions of the social support they received. The paper proceeds with the literature review followed by the methodology. The next two sections highlight the study's results, providing a relevant discussion, and addressing the implications. The paper culminates in the conclusions, the relative limitations and suggestions for further studies.

2. Literature Review

2.1. Employee Resilience

Employee resilience is the ability to adapt to the volatility of the surrounding environment (London, 1993) and recover from stressful and exhausting situations (Bani-Melhem et al., 2021; Peng et al., 2022). Resilient employees are crucial to organizational success, as their adaptability allows them to navigate uncertainties, maintain their well-being, and foster a positive work environment. This not only helps individuals thrive but also bolsters the organization's overall resilience, contributing to its sustainability. Research supports the idea that resilience fortifies employees' psychology against adverse feelings (Al-Hawari et al., 2019) and plays a key role in the recovery phase following a crisis (Kim, 2020).

Despite the critical importance of employee resilience in organizational efficiency, the literature has not fully explored the factors that influence it (Peng et al., 2022). Since resilience is closely linked to employees' psychological state, it is particularly susceptible to the level of perceived social support they receive. In public organizations, where economic incentives are limited, employee psychology heavily depends on stakeholders' perceptions of the organization's value creation within the community. This social support acts as a buffer against stress, providing encouragement and a sense of belonging, which helps employees manage workplace challenges more effectively (Padmanabhanunni et al., 2023).

2.2. Emotional Online Social Support and Resilience

Given the high-stress nature of security personnel's work in the context of refugee crises, which often involves dealing with vulnerable populations under intense scrutiny, access to social support via digital platforms can be a vital source of psychological resilience (Kanapeckaitė & Bagdžiūnienė, 2024). Through social media and online communities, security personnel can connect with peers, family members, and the broader public, receiving emotional encouragement, empathy, and affirmation of their efforts.

According to the literature, individuals typically draw upon three main types of resources through social interaction: tangible, informational, and emotional support (Liu et al., 2018; Uchino, 2004). Social support helps alleviate the isolation and pressure that often arises from working in high-stress and demanding environments, while reinforcing their commitment to their duties and enhancing their ability to manage stress (Luo et al., 2022). In the context of this study, due to the operational demands of security forces personnel—who were deployed on the field and allowed to interact only at specific times each day—and the unique nature of the crisis situation, our focus was limited to emotional social support. Since both tangible and informational support were primarily provided by other organizational members in the field through direct interaction and communication, emotional support from external sources, such as family or social networks, became a key focus. This choice was made to better understand how this particular type of support influences their resilience and well-being in such constrained and challenging circumstances. By isolating emotional support in our analysis, we aimed to assess its unique contribution to helping these individuals manage stress and maintain their commitment under high-pressure conditions.

The pervasive presence of the internet and social media is a ground dimension that every military organization must embrace (Hellman et al., 2016). A significant percentage of the armed forces personnel engage in social media platforms systematically, whether for recreational purposes, information gathering, or staying connected with their social communities. Online interaction influences how employees consume, disseminate, and comment on content (Zhao et al., 2021).

Previous research presents conflicting findings regarding the impact of online social support and generally online interaction, especially in armed forces. Some studies suggest that it may be associated with increased stress (Dam et al., 2017) and reduced work performance (Liu & Ma, 2019) as well as the possibility of increased risk in revealing sensitive information remain always in the scene. On the other hand, other studies have demonstrated that online interaction can positively influence employees psychological states, enhancing their ability to respond effectively to challenging situations (Galanis et al., 2022) as well as having beneficial effect on armed forces personnel psychology acting in stressful and demanding situations and environment such as peacekeeping operations or war zones (Hellman et al., 2016; Hellman & Wagnsson, 2015). While online social support is recognized as a crucial factor in managing stress levels and maintaining mental well-being, there is a significant gap in empirical evidence specifically focused on security personnel. Public organizations, especially those in the security sector, depend heavily on public acceptance and community support, given their lack of profit-driven motives. Based on the aforementioned considerations, we propose the following hypothesis:

Hypothesis 1: The perceived emotional online social support of Greek security personnel is positively related to their resilience levels in the context of the refugee crisis of 2020.

2.3. Emotional Online Social Support and Organizational Identification

Online social support plays a crucial role in fostering connectedness and replenishing the positive emotions that may be depleted in employees facing challenging situations (Myrick et al., 2023). The digital environment offers opportunities to express empathy, encouragement, and support, particularly for security personnel who may be distant from friends and family, and in need of feeling heard and understood as individuals (Jin et al., 2014). However, social media can also become a platform for debates, arguments, and conflict, depending on the stance of participants and the nature of comments or posts (Opitz et al., 2018). In this study, we focused on the impact of supportive feedback and positive comments on security employees' actions. Such feedback can help security personnel align their self-concept with their organization's identity, fostering a deeper connection with the organization and function as a buffer to the crisis related stress enhancing their well-being (Zhao et al., 2021). Conversely, negative or critical comments may challenge this alignment, potentially impacting morale and aggravating their psychological condition (Belschak & Hartog, 2009). For public organizations, such as security providers, emotional support during crisis management is crucial for fostering a sense of contribution to the common good and creating value for the broader community (O'Keefe et al., 2019).

Haslam et al. (2005) and Wegge et al. (2012) have shown that employees with higher levels of identification report less stress and greater persistence in the face of adversity. Organizational members with strong identification are also more likely to receive social support, as they typically demonstrate active engagement with the evolving situation and a commitment to serving the common good (Levine et al., 2005). These employees are better psychologically prepared and more likely to be creative in achieving organizational goals compared to those with lower identification (Avanzi et al., 2015). Building on this foundation, we propose the following hypothesis for testing:

Hypothesis 2: The perceived emotional online social support of Greek security personnel is positively related to their organizational identification levels in the context of the refugee crisis of 2020.

2.4. Organizational Identification and Resilience

Organizational identification is defined as an individual's sense of unity with or connection to an organization (Ashforth & Mael, 1989). Individuals have an inherent desire to identify with groups perceived as significant and favorably compared to others, which boosts their self-esteem (Tyler, 1989). A review of the literature underscores the importance of organizational identification, linking it to various positive employee behaviors and attitudes. These include increased engagement, improved performance, enhanced socialization, and a stronger organizational image (van Knippenberg, 2000; Weisman et al., 2022). Furthermore, identification seems to be associated with resilience and sustainability, indicating a positive correlation between employees'

identification with their organization and their propensity to remain resilient in challenging situations (Fairfield, 2019; Peng et al., 2022). This underscores the pivotal value of organizational identification, particularly during times of crisis, when fostering a strong sense of belonging can be crucial to maintaining organizational stability and effectiveness (Woods & Watkins, 2022). However, most of this evidence comes from the private sector, leaving a significant gap in public organizations, where financial incentives or promotions tied to achieving organizational goals are not applicable. In this study we postulate that the members who strongly identify with their organization are more likely to develop a collective stance against evolving challenges. This sense of affiliation may enhance their ability to cope with stress, adapt to volatile situations, and remain focused and dedicated to achieving organizational goals, contributing in the promotion of sustained resilience (Mao et al., 2022). Therefore, based on the above, we propose the following hypothesis:

Hypothesis 3: Organizational identification of Greek security personnel is positively associated with their perception of resilience in the context of the refugee crisis of 2020.

2.5. The Mediating role of the Organizational Identification

Organizational identification is a crucial multi-dimensional factor forging employees' morale (Klimchak et al., 2019), their work engagement commitment to the organization and higher motivation (Weisman et al., 2022). Prior evidence has indicated that identification can be enhanced through social support, either stemming from co-workers, supervisors or the broader social environment since these expressions of acceptance and appreciation contribute in feeling valued and significant for the organization as well as creating value for the community (van Knippenberg, 2000; Weisman et al., 2022). When the individual is highly affiliated with the organization it is probable that the employee will demonstrate robustness, decisiveness and commitment in accomplishing the organizational goals (Mao et al., 2022). Especially in times of crisis when adaptability is a substantial requirement and the psychological deposits may start to fade away gradually, the identification can act as a potential antecedent of the employee resilience. Based upon the abovementioned we project the following hypothesis for testing:

Hypothesis 4: The organizational identification of the security personnel mediates the relationship between online social support and resilience in the context of the refugee crisis of 2020.

3. The Role of Social Media in Crisis Communication for Security Personnel

In recent years, social media platforms and networking sites have emerged as vital tools for public leadership in crisis communication. Beyond traditional methods of relaying information, these platforms enable real-time updates, live streaming, direct interaction with the public, and immediate feedback (Gupta, 2017). Public leaders use social media not only to broadcast critical crisis-related information but also to gauge public sentiment, monitor rumors, and address misinformation (Luo et al., 2015). Timely and systematic communication through these channels can significantly enhance transparency and build trust with the community, a factor that is crucial during times of crisis (Luo et al., 2015; Triantafillidou & Yannas, 2020).

In addition to the formal accounts many armies maintain worldwide, the use of social media by security personnel is subject to strict guidelines and limitations (Kalkman & Groenewegen, 2018). While social media platforms provide valuable opportunities for personal connections and expressions of support, security personnel are not authorized to share details about ongoing operations or crisis management efforts (Lawson, 2014; Olsson et al., 2016). They must exercise caution in their public posts, as unauthorized communication could compromise security, spread misinformation, or unintentionally escalate a situation (Lawson, 2014; Triantafillidou & Yannas, 2023). However, when used responsibly, social media allows security personnel to stay connected with their support networks, receive encouragement from friends and family, and share experiences that foster camaraderie (Soeters & Tresch, 2010).

4. Methodology

4.1. Sample and Procedure

In this study, we utilized a structured questionnaire, which was deemed the most suitable method for gathering and processing information to conduct statistical analysis and reveal both direct and indirect relationships between variables (Vogt et al., 2014). Additionally, this approach ensured the anonymity of the participants.

To collect data, we conducted a questionnaire survey targeting security personnel directly involved in managing the refugee crisis in the Evros region from February to April 2020. We employed the snowball sampling method, which enabled us to reach potential participants by utilizing our personal and professional networks both online and offline. This method allowed us to start with initial respondents, who were then asked to share the survey with colleagues and peers who also participated in the crisis management efforts (Patton, 2015). By encouraging this chain-referral process, we expanded our sample size and gathered insights from a diverse group of security personnel across various branches (army, police, border patrol), roles (including nurses), and levels of social media engagement. This included individuals who interacted on social network sites in different capacities—as content consumers, contributors, or creators—offering a broader perspective on how social media use influenced their experiences and resilience during the crisis. This layered approach provided rich data on the different ways personnel engaged with digital platforms and how this engagement varied based on their roles and responsibilities, contributing to a nuanced understanding of online interactions in a crisis setting.

The process began in January 2024, with participants being informed about the study's purpose and provided with online informed consent. They were also encouraged to share the survey with other employees who had direct involvement in the 2020 crisis. We assured participants that their responses would remain anonymous and that they could withdraw from the study at any time. A total of 248 responses were collected, and after excluding 11 invalid questionnaires, the final sample consisted of 237 security personnel. This group included members of the armed forces, police, firefighters, border patrol officers, and nurses, many of whom were serving in different units. The demographic and online activity characteristics of the sample are presented in Table 1.

Table 1. Sample Characteristics

Variables	Categories	N	Percentages
Gender	Male	209	88.11%
	Female	28	11.89%
Profession	Armed Forces Personnel	188	79.32%
	Police Personnel	27	11.39%
	Firefighters	7	2.95%
	Border Patrol Personnel	10	4.22%
	Nurses	5	2.21%
Age	22 – 35	98	41.35%
	36 – 45	112	47.26%
	46 – 55	27	11.39%
Social Network Site	Facebook	225	94.94%
	Instagram	174	73.41%
	Tik Tok	23	09.70%
	LinkedIn	102	43.04%
	X (Twitter)	98	41.35%
	Viber	233	98.31%
	Messenger	195	82.27%
	Whatsapp	189	79.75%
Signal	84	35.44%	
Visit Social Media Platforms	Very Frequently (4times/day and more)	64	27.00%
	Frequently (1-3times/day)	125	52.74%
	Occasionally (1 every 2 days)	20	08.44%
	Rarely (1 per week)	28	11.81%
Content Consumers			
Type of activities “consumers” engage in	Watching videos or reading posts without interacting	162	68.35%
	Watching images or stories without interacting		
	Checking updates from friends or brands without interacting		
Content Contributors			
Type of activities “contributors” engage in	Watching videos or reading posts and commenting/ interacting	64	27.01%
	Watching images or stories and commenting/ interacting		
	Checking updates from friends or brands and commenting/ interacting		
Content Creators			
	Posting original videos or photos	11	4.64%

Type of activities “creators” engage in	Writing and sharing personal thoughts, opinions or commenting on everyday issues.		
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4.1. Measures

To measure the Emotional Online Social Support (EOSS) variable, we used the 10-item scale developed by Nick et al. (2018). The Organizational Identification (OI) level of participants was assessed using the six-question scale from Mael and Ashforth (1992). For Employee Resilience (ER), we employed a 9-item scale previously utilized by Näswall et al. (2015). The questionnaire utilized a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree) to rate the independent variables (EOSS and OI) and the dependent variable (ER).

5. Results

5.1 Descriptive Statistics

The results indicate that security forces personnel felt they received support from their social environment during that period (EOSS, M= 3.41, SD=1.08). Additionally, their level of organizational identification was found to be strong and positively related to their connection with the organization and its goals (OI: M = 3.88, SD = 0.99). Regarding the third variable, the findings show that security personnel felt highly resilient and adaptable to the challenging circumstances of the crisis period (ER: M = 4.39, SD = 1.03).

Table 2. Cronbach’s Alpha, Mean and Standard Deviation.

Variables	a	M	SD
1. Emotional Online Social Support	0.89	3.41	1.08
2. Organizational Identification	0.91	3.88	0.99
3. Employee Resilience	0.85	4.39	1.03

Table 3. Total, Direct and Indirect effects of the paths, and 95% bias-corrected confidence intervals

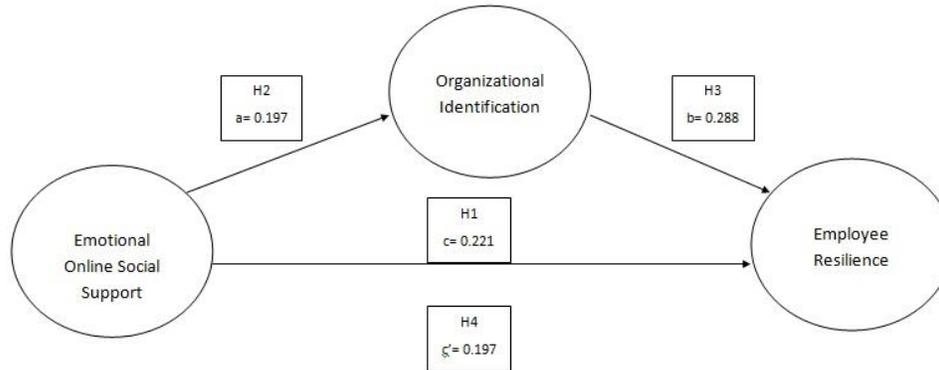
Hypothesis	Path	Correlation	LLCI	ULCI	T
H1	EOSS → ER	0.221**	0.084	0.337	4.101
H2	EOSS → OI	0.197**	0.055	0.298	3.602
H3	OI → ER	0.288**	0.101	0.382	4.924
H4	EOSS → OI → ER	0.176**	0.041	0.204	3.256

**p<0.001

Table 4 Standardized Factor Loadings for Items Assessing the Three Theoretical Constructs.

Variable	Coding	Question	Extraction
Emotional Online Social Support	EOSS1	People show that they care about me online.	0,675
	EOSS2	Online, people say or do things that make me feel good about myself.	0,688
	EOSS3	People encourage me when I'm online.	0,650
	EOSS4	People pay attention to me online.	0,435
	EOSS5	I get likes, favorites, upvotes, views, etc. online.	0,621
	EOSS6	I get positive comments online	0,678
	EOSS7	When I'm online, people tell me they like the things I say or do.	0,583
	EOSS8	Online, people are interested in me as a person.	0,721
	EOSS9	People support me online.	0,788
	EOSS10	When I'm online, people make me feel good about myself.	0,719
Organizational Identification	OI1	When someone criticizes my Organization, it feels like a personal insult.	0,832
	OI2	I am very interested in what others think about the my Organization	0,815
	OI3	When I talk about the my Organization, I usually say 'we' rather than 'they'	0,794
	OI4	The Organization's successes are my successes	0,684
	OI5	When someone praises my Organization , it feels like a personal compliment	0,612
	OI6	If a story in the media criticized the my Organization, I would feel embarrassed	0,734
Employee Resilience	ER1	I effectively collaborate with others to handle unexpected challenges at work	0,699
	ER2	I successfully manage a high workload for long periods of time	0,701
	ER3	I resolve crises competently at work	0,822
	ER4	I learn from mistakes at work and improve the way I do my job	0,673
	ER5	I re-evaluate my performance and continually improve the way I do my work	0,726
	ER6	I effectively respond to feedback at work, even criticism	0,756
	ER7	I seek assistance to work when I need specific resources	0,711
	ER8	I approach managers when I need their support	0,800
	ER9	I use change at work as an opportunity for growth	0,817

Figure 1. The proposed research model.



5.2. Data Analysis

To test the proposed model we conducted a series of analyses using PROCESS 4.2 macro for SPSS Statistics developed by Hayes (2017), specifically model 4 for mediation analysis. Based on 5,000 bootstrapped resamples, PROCESS can provide 95% confidence intervals (CI) for total effects, direct effects, and indirect effects. If the CI excludes zero, the effect is significant. Therefore, it is suitable for testing mediation effects (Cheng et al., 2022). To ensure the robustness of the model, we ran additional analyses incorporating gender, and the engagement level (content consumers, contributors, and creators) stationing as covariates (Pugliese et al., 2023), yielding the same results as presented in table 3.

The statistical analysis shows a strong positive relationship between **EOSS** and **ER** ($c = 0.221$, $T = 4.101$, $p < .001$). We then examined the effect of **EOSS** on **OI**, which was also positive and significant ($a = 0.197$, $T = 3.602$, $p < .001$), as well as the relationship between **OI** and **ER** ($b = 0.288$, $T = 4.924$, $p < .001$), which was similarly strong and positive. The total correlation of the variables, considering the mediating effect, revealed a significant positive relationship ($c' = 0.176$, $T = 3.256$, $p < .001$). Next, we analyzed the indirect effect of **EOSS** on **ER** through **OI**, focusing on the confidence interval limits [BootLLCI (.0410) – BootULCI (0.204)] and found that the value of 0 was not included. This finding suggests that **OI** partially mediates the relationship between **EOSS** and **ER**.

6. Discussion

In this paper, we investigated the relationship between emotional online social support and security personnel resilience, with a focus on the mediating effect of organizational identification, within the context of the refugee crisis of 2020. We gained insights from security forces personnel and considered the role of social networking interactions. Previous research has explored social support and employee resilience primarily within the health services sector (Mao et al., 2023; Shahwan et al., 2024). This study aimed to elucidate the underlying mechanisms affecting security personnel resilience, a crucial factor for public organizational effectiveness during crisis management. The

results revealed that both social support received through social media platforms and organizational identification are significant predictors of the security personnel resilience in challenging times. Furthermore, online social support positively contributes to security forces resilience through the sequential mediation effect of organizational identification. These findings contribute to a comprehensive understanding of the interplay between these concepts.

The analysis revealed a strong positive relationship between emotional online social support and personnel resilience (H1). Security personnel who receive support through social networking sites tend to experience improved psychological well-being and demonstrate greater resilience during difficult times. This finding is consistent with existing literature, which highlights the beneficial impact of social support on employee resilience (Galanis et al., 2022; Mao et al., 2022; Shahwan et al., 2024). However, existing research has predominantly focused on the health services sector, particularly in the context of COVID-19. This study extends the applicability of these relationships to new sectors, broadening the discussion to various public organizations.

Regarding the effect of emotional online social support on security personnel organizational identification (H2), the findings revealed a strong and positive relationship. In other words, security personnel who receive positive feedback and comments are more likely to develop a stronger affiliation with their organization's goals. One possible explanation is that employees perceive that their organization adds value to the community, benefiting its members, and thus feel that they are actively participating in this process through their membership. Previous research supports this finding (Ng & Sorensen, 2008; Poulsen et al., 2016), indicating that social support from various sources—such as friends, family, co-workers, supervisors, and online networks—can enhance employees' organizational identification.

Similarly, the relationship between the organizational identification of the security personnel and their resilience levels was found to be strong and positive (H3). This suggests that in uniform employees who align closely with the organization's identity and invest effort in achieving its goals and upholding its values are more resilient during critical times. Having higher identification is a crucial factor that enables them to handle pressure and contribute to the organization's sustainability. This insight is consistent with prior research that highlights the beneficial role of organizational identification in enhancing sustainability and performance (Fairfield, 2019; Mao et al., 2022; Peng et al., 2022).

In reference to the proposed mediating role of organizational identification between emotional online social support and employee resilience, the results supported our hypothesis (H4). The findings indicate that security personnel who received positive feedback from their online social environment exhibited higher resilience when they felt a strong sense of belonging to their organization. This suggests that organizational identification plays a crucial role in enhancing employee resilience, a factor that should be considered from a managerial perspective. To date literature has highlighted the role of organizational identification as a significant factor that improves employee's and, consequently, organizational performance in general (Mao et al., 2023; van Knippenberg et al., 2007).

This study represents, to the best of our knowledge, the first effort to explore the relationship between emotional online social support and security personnel resilience, with a focus on the mediating role of organizational identification. While there has been previous researches on these concepts in various academic fields, public organizations members perspective during refugee crises, which play a critical role in crisis management, have been underrepresented. The insights gained from examining the relationships between these three concepts offer valuable implications for theory and practice, particularly from managerial, human resources, and communication perspectives.

6.1. Theoretical Implications

This study significantly advances the literature on online social support and in uniform employees' resilience by uncovering the mediating role of organizational identification in crisis contexts. While previous research has explored the impact of social support on employees' psychological well-being during challenging situations with a special focus on COVID-19 crisis (Mao et al., 2023; Shahwan et al., 2024), this study focuses on social media use and organizational identification, areas that have been largely overlooked.

Additionally, this research extends the discussion to public organizations, highlighting mechanisms that can enhance security personnel resilience, which, in turn, contributes to organizational resilience and sustainability. The study underscores the importance of online social support in overcoming physical barriers, especially in high-stress situations where employees' professionalism, humanity, and sense of duty are under public scrutiny. In such demanding contexts, the support provided through online channels becomes crucial for fostering resilience amidst stress and anxiety (Morgan, 2023; Shahwan et al., 2024).

Our study also expands social support theories by incorporating the digital dimension of networking as a crucial factor in building resilience among security personnel. In an era where online interactions increasingly shape organizational dynamics, this research shows how digital platforms can serve as vital channels for providing emotional support during crises to the most valuable asset in public organizations' crisis management efforts—uniformed personnel. This digital aspect introduces a new layer to traditional social support frameworks, emphasizing the role of virtual communities in fostering resilience, particularly when physical barriers or widespread disruptions hinder face-to-face interactions. This aligns with the calls for further investigation made by Myrick et al. (2023), and Näswall et al. (2015), who urged researchers to explore the evolving role of digital networks in enhancing employee and organizational resilience.

Furthermore, by examining the mediating role of organizational identification, our study bridges crisis management with social identity theory, offering a nuanced understanding of how employees' sense of belonging to their organization can affect the effectiveness of crisis management efforts. Organizational identification emerges as a crucial factor that not only strengthens security personnel resilience but also enhances their commitment to the organization's

goals during a crisis. This interplay between identity and crisis response suggests that cultivating a strong organizational identity can be a strategic tool in managing crises, as it indirectly boosts the organization's ability to navigate and recover from challenging situations (Mao et al., 2023; Peng et al., 2022).

6.2. Practical Implications

This study offers valuable contributions to management and public relations, particularly within the context of crisis management. Based on our findings, we recommend that organizational leaders actively encourage employees to develop and expand their social networks, both in physical settings and online. By fostering a robust social network, employees can enhance their presence on social media platforms, increasing their visibility and opening up opportunities for receiving greater support and constructive feedback from peers and the broader community. This support can, in turn, bolster their resilience and ability to cope with stress during challenging times (Huang & Liu, 2017; Zhou et al., 2022).

Moreover, our research highlights the critical role of organizational identification, particularly in high-pressure situations. Leaders should focus on strengthening employees' sense of belonging and alignment with the organization's values and mission. This approach helps create a more cohesive and supportive work environment where employees feel connected, valued, and motivated to contribute positively to the organization's goals, even in the face of adversity.

Leadership should also prioritize boosting employees' self-esteem and empowerment by demonstrating trust and confidence in them. Building this foundation of trust is essential for fostering a resilient and motivated workforce. Leaders can adopt a two-way communication style that encourages open dialogue and feedback, allowing employees to feel that their opinions are valued and that they play an active role in the decision-making process. This inclusive approach enhances employees' sense of belonging and identification with the organization. When employees feel more connected and appreciated, they are more likely to support and engage with organizational initiatives that promote openness and transparency (Bose et al. 2020; Mao et al., 2023). Employees who exhibit a high level of organizational identification are also more inclined to share and promote beneficial initiatives, helping to disseminate key messages and showcase the organization's high morale and cohesion.

7. Conclusions, Limitations and suggestions for future research

In summary, this study addresses a significant gap in the literature regarding the role of online crisis communication through security personnel's social media accounts and how their resilience is influenced by these interactions. Specifically, we examined the impact of emotional online social support on personnel resilience and organizational identification. The findings highlight the critical role social media plays in such situations, not only as a tool for external communication but also as a source of support for those directly involved in crisis management. This underscores the necessity for leadership to actively foster security personnel's self-esteem and strengthen their

identification with the organization, which in turn fortifies their resilience in managing crises. By cultivating a sense of belonging and providing emotional reinforcement through online channels, organizations can enhance the ability of their personnel to withstand and adapt to high-pressure situations. This study ultimately calls for more attention to the integration of social media as a strategic asset in crisis communication and resilience-building efforts.

Several limitations of the current study highlight potential avenues for future research. The sample, limited to Greek security forces personnel, may restrict the generalizability of the findings. We also set to explore only the refugee crisis in 2020 at the region of Evros. Moreover, we centered our focus on emotional online social support as a significant factor affecting the perceptions of the personnel involved in such situations.

To enhance the robustness of future studies, incorporating perspectives from personnel in international organizations such as FRONTEX would provide valuable insights. Additionally, conducting cross-country research in diverse contexts, such as Spain, Italy, or the USA, would help understand how different environments and organizational settings impact organizational identification and resilience. Longitudinal studies could further track changes in these variables over time, while comparative studies could examine experiences in countries facing varying levels of security challenges. Investigating the influence of technological advancements, including social media, on emotional support and resilience could also offer new dimensions. Moreover, including perspectives from other stakeholders, like non-governmental organizations or community leaders, could provide a more comprehensive understanding of the factors influencing organizational dynamics.

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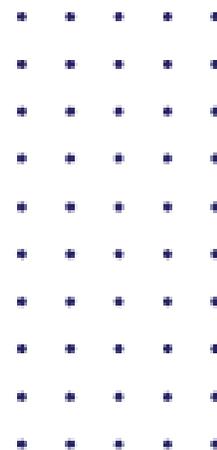
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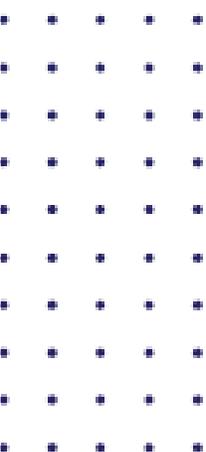
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