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FACULTY OF ENVIRONMENTAL SCIENCE AND ENGINEERING

ENVIRONMENTAL SCIENCE PHD SCHOOL

Disaster risk communication through emergency management institutions' Facebook pages – from perception to practice

- ABSTRACT OF THE PHD THESIS-

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INTRODUCTION

In recent decades, the number and frequency of natural and technological disasters have increased significantly (Forzieri et al., 2017). Thus, integrated risk assessment became an international priority. For example, the European Commission has initiated a process to create a unique methodological framework for risk assessment that would enable the development of common European strategies and policies (European Commission, 2010). Therefore, many EU Member States have already developed risk assessment methodologies adopted in national legislations to improve their capacity of responding by prevention, preparedness and intervention measures to the identified risks. In this context, Romania has aligned with the European initiative by developing and implementing the project "National Risk Assessment – RO RISK". Following this assessment, disaster risk communication was identified as an important tool to reduce the vulnerability of communities exposed to these risks in the national disaster management process (IGSU, 2016).

Disaster risk communication, as part of the disaster risk management process, has undergone significant change in recent years due to the advancement of communication technologies. These technologies, especially social media platforms, have redefined some functions and roles of communication across the various stages of disaster management, creating new possibilities for risk information to be communicated online. In this context, the thesis at hand deals with a fresh and relevant topic, namely **the use of social media platforms in order to increase the efficacy of disaster risk communication and prevention.**

In recent years, numerous international studies have been developed to investigate the use of social media platforms by emergency services (Flizikowski et al., 2014, Meltzer et al., 2015, Gizikis et al., 2017). Most studies in this area come from the US, while less address the phenomenon in Europe (Reuter & Kaufhold, 2018), and the way emergency services use the opportunities offered by social networks for disaster risk communication, which can differ according to the organizational culture (Reuter et al., 2016). Thus, the thesis **investigates how Romanian emergency management agencies use social media platforms for disaster risk communication**.

The topic of the thesis holds a lot of interest, because **it seeks an interdisciplinary approach** to the way in which Romanian citizens are **exposed to risk information through**

social networks. It also investigates how the users of these networks interact with these messages. In this sense, **the novelty** of the present thesis consists primarily in the application of methodologies inspired by communication sciences and social marketing techniques in order to investigate this phenomenon.

The research methodologies developed in this paper are based on **in-depth knowledge of risk management**. Thus, the results of the research are structured around the concept of disaster risk communication, approaching specific elements of disaster risk communication through social media.

The thesis also aims to **frame the obtained results**, which outline trends in communicating risk at a national level, **in an international context**. In this respect, the results were presented in comparison with other relevant research in the field at international level.

An in-depth understanding of the studied phenomenon is important, because such an approach can help to develop guidelines **to facilitate the taking up and the effective use of social media for disaster risk communication** by disaster management institutions in order to create a **resilience culture in the online environment**.

The aim and objectives of the doctoral thesis

The aim of the present thesis was to analyze **disaster risk communication trends through emergency management institutions' social media channels**.

To accomplish this goal, a comprehensive methodology has been used to analyze the messages posted on Facebook pages by a number of 36 emergency inspectorates at both national and county level to identify the main content categories. The paper also analyzed the degree of user engagement to published messages in order to identify the most popular message categories and investigated the perception of the employees of these institutions about the challenges and potentials of Facebook's adaptation to disaster risk communication in a formal context.

To achieve this goal, the following study objectives were pursued:
➢ Presentation of a literature review on the evolution of disaster risk communication;
➢ Presentation of a literature review on the use of social media platforms for communicating disaster risk;
➢ Analysis of the legislative documents on disaster risk communication at national level;

- ➢ Identifying emergency inspectorates with an active Facebook page;
- ➢ Analysis of the main elements of the main page to identify trends in the way the institutions included in the study are represented on Facebook;
- ➢ Retrieving messages published between 1 January and 25 October 2017 on the identified pages;
- ➢ Determining the degree of engagement of the online audience to the Facebook page of each institution included in this study;
- ➢ Elaborating and applying a coding agenda to identify the main categories of messages published on the analyzed pages;
- ➢ Determining the relation between the different categories of messages and the degree of engagement of the audience based on a coding agenda developed for this study;
- ➢ Determining the relation between the different types of messages and the degree of user engagement;
- ➢ Identifying the main topics specific to disaster risk communication through Facebook pages;
- ➢ Determining the context in which messages about natural hazards are published;
- ➢ Analyzing the specific elements related to communication through social media platforms (e.g. use of hashtags and partner networks);
- ➢ Elaborating and applying a questionnaire which investigates the attitude of the employees in the emergency management institutions regarding the use of Facebook pages for communication activities;
- ➢ Develop a set of good practice recommendations for the use of Facebook by emergency services, based on the results of case studies.

The inspectorates for emergency situations have been chosen as the main subjects of the analysis because their disaster risk communication responsibilities are defined by complex national strategies. Therefore, the study analyzed how existing provisions are transposed into their Facebook communication strategies.

Facebook was chosen as the subject of the present paper, because at the moment it is the most popular social network in Romania (StatCounter, 2018), with more and more Romanian users using the platform to seek out information (Newman et al., 2018).

Structure of the PhD thesis

In order to achieve the purpose and objectives of this paper, it was structured into seven chapters, as follows:

Chapter 1 describes the evolution of disaster risk communication from the 1970s to the appearance of Web 2.0 in the 2000s. In this chapter, the theoretical framework underlying the other chapters is established, operationalizing the notion of **disaster risk communication** as an umbrella concept for risk communication, crisis communication and emergency communication. At the same time, the most important aspects of the scientific discourse concerning the development of disaster risk communication are used as a reference point in this paper. These include: (1) **risk perception and its influencing factors**; (2) **the main objectives of disaster risk communication**, and (3) **disaster management cycle.**

Chapter 2 discusses how the advancement of communication technologies has redefined some functions and roles of communication across the various stages of disaster management. In this respect, empirical studies relevant to the field are presented in this chapter. The chapter also includes many examples of using these social networks in the various stages of disaster management in the context of several major events that have taken place in the past, such as the **2010 earthquake in Port-au-Prince, Haiti** (Zook et al., 2010; Weberling & Waters, 2012), **Hurricane Sandy in 2012, in the US** (Fraustino et al., 2012; Lachlan et al., 2014; Spence et al., 2015, 2016) or **the nuclear accident at Fukushima-Daiichi in 2011, in Japan** (Funabashi & Kitazawa, 2012; Figueroa, 2013; Haddow & Haddow, 2013). These examples illustrate the various possible uses of social networks by emergency services and citizens for disaster risk communication. The theories presented in this chapter represent a starting point for the development of methodologies applied in the case studies.

Chapter 3 presents the legislative framework that shapes the disaster risk communicational efforts at a national level. A detailed analysis of the National Communication and Public Information Strategy for Emergency Situations is also presented. Similar to the previous chapter, the information presented in this chapter also serves to develop the research tools used in the case studies.

Chapter 4 presents the first case study, which, using the observational method, analyzes the main elements of the Facebook institutional page of the inspectorates for emergency

situations. The focus of this analysis is on identifying the main trends of representation of emergency inspectorates on Facebook.

Chapter 5 examines the main trends in the use of Facebook pages by emergency inspectorates. The study is based on 8683 unique messages published between 1 January and 25 October 2017 on the official Facebook pages of the inspectorates for emergency situations at national and county level. The analysis aims to identify the main content and types of messages published by these institutions in relation to the degree of commitment of users towards them. Particular attention is paid to messages that refer to different natural hazards. In this respect, the main themes and the context in which these messages have been published are investigated.

Chapter 6 presents the results of an on-line questionnaire. The 44 questionnaires completed are based on observation of the attitudes of respondents employed in leadership and public relations positions in the inspectorates for emergency management. The results of this study provide a qualitative perspective of the main challenges and possibilities of using the disaster risk communication platform at national level.

Chapter 7 presents the final conclusions of the study, as well as personal contributions and prospects for the future. The chapter also includes a set of good practices, based on the results of the case studies. These include practical tips that can be implemented by emergency services in the future to improve Facebook communication.

These theoretical and practical aspects followed through the thesis facilitate the detailed investigation of the proposed topic from **a multidisciplinary perspective**, combining in-depth knowledge of natural risks and their management with communication science methodologies. Thus, the results provide a detailed picture of how Romanian emergency management institutions use Facebook for disaster risk communication.

Disaster risk communication and social media

Disaster risk communication is an integral part of the disaster risk management process and one of the basic elements of an efficient and functional management system. The communication takes place at several levels: either between organizations dealing with the management of emergency situations arising from disaster risks, or between these institutions and the communities exposed to such threats (Reuter, 2015).

Communication between institutions and communities is one of the main non-structural measures to reduce the risk of disasters in communities (Coppola, 2015), and in the last few decades it has undergone significant change. The basis for these changes is primarily the advancement of communication technologies, such as the development of social media platforms, which have changed the way people communicate.

Social networks are increasingly being used by the population, especially because, thanks to technological advancement, they are currently accessible via mobile phones. They quickly adopted new communication services in their daily routine to connect with friends, find and share information online, upload original content, and so on. (Meltzer et al., 2014).

Thus, it is not surprising that the interest in using these networks for disaster risk communication came from citizens (Palen & Liu, 2007), as these networks provided citizens with alternative ways to find and disseminate relevant information about the emergency situations in real time (Simon et al., 2015).

There are two reasons behind the increased interest of citizens for the use of these networks for disaster risk communication: (1) the information provided by the media often did not correspond to the specific information needs of the public, and focused on the sensational aspects of the situations and (2) official information from the competent authorities on emergency management was transmitted too late and did not contain specific information on the localized threats to which smaller communities were exposed (Taylor & Gillette, 2005; Shklovski et al., 2008).

Over time, public participation in communicating disaster risk through social media has diversified, as the features of these networks are capable of performing necessary functions for each disaster management stage (Kaminska & Rutten, 2014; Houston et al., 2015; al., 2016). Also, the amount of information uploaded to these platforms by the public is continuously increasing. This information, often in the form of pictures or video clips, which also contain geographical locations, brought their contribution to awareness in the first few hours of an emergency situation (Liu et al., 2008, Shklovski et al., 2008, Stahl, 2013).

Beyond the potential of this data to support the preparation and response effort of communities at risk, data was also valuable for competent authorities in managing emergency situations (Wang et al., 2015). These platforms also offer people unlimited opportunities for disaster risk management to develop and support the necessary social capital to reduce the risk of

disasters (Haddow et al., 2014). Thus, it was imminent for these authorities to comply with new trends in communicating disaster risk.

The early establishment of a presence on social media platforms by emergency management institutions' is important, especially considering the increasing demand of citizens for such a presence (Anikeeva et al., 2016; Reuter & Spielhofer, 2017, Meltzer et al., 2018). Many authorities have recognized the need to be present on social media networks used by the citizens and have adopted new forms of disaster risk communication.

The potential to use social media channels by emergency management institutions can be divided into two main categories: (1) disseminating risk information on social networks and/or (2) monitoring user-generated content on these networks (Latonero & Shklovski, 2011). The latter facilitates the bilateral exchange of information, both between authorities and individuals, and between authorities and the community (Wukich, 2015).

Based on these two categories, Mergel (2014) identified three communication tactics by analyzing the social media pages of the New York authorities responsible for communicating disaster risk, namely: (1) "push" tactics; (2) "pull" tactics and (3) "networking" tactics. The "push" tactic is similar to disaster risk communication through traditional communication channels, and it is focused on the quick dissemination of messages. By contrast, the other two tactics allow a more pronounced interaction between the authorities and the public. However, at the moment, most institutions with skills in emergency management predominantly use "push" tactics (Mergel, 2014; Reuter et al., 2016).

In conclusion, there is a wide range of possibilities for the use of social networks for disaster risk communication by emergency management institutions. Some researchers believe in the future there will be a process of maturing social networks as a further communication channel for the institutions responsible for managing natural risks through which these institutions will conclude in "trusted partnerships and collaboration" with network users, who in turn will form a "networked and resilient community" (Kaminska & Rutten 2014: p.15).

Disaster risk communication trends in Romanian emergency management institutions' Facebook use in relation with user engagement

Through this study, a detailed analysis of messages published by Romanian inspectorates for emergency situations has been carried out. In order to identify the main content categories, 8683 unique messages published between 1 January and 25 October 2017 on the official Facebook pages of the Romanian inspectorates for emergency situations were subjected to content analysis based on a coding agenda specifically designed for this study, containing 7 content categories, as follows: (1) natural hazard; (2) everyday risk; (3) organization promotion; (4) marketing of their own services; (5) alarm drill; (6) first aid education and (7) non-information. Some of the seven categories were also divided in additional subcategories. The trends regarding the use of different message types in order to illustrate different content have also been followed. A matrix developed by Bonson and Ratkai (2013) was applied to measure user engagement with published messages. User engagement was calculated based on the content and type of messages, to identify the most popular themes and how they were illustrated.

The observations of this research have helped to identify trends in the use of different types of messages published on Facebook by the examined inspectorates. The results of this paper have shown a high user engagement for multimedia content. In this regard, live recordings, images and videos are the most engaging types of messages, while messages that contained links or were published as status generated low user interactions. Also, there was a strong link between user engagement based on the type and content of messages. In this respect, higher engagement rates were recorded for message content that was illustrated using mostly multimedia content. In conclusion, message illustration influences how users interact with them. Thus, the use of these interactive formats by the inspectorates is encouraged.

Regarding recurrent message content, this study has identified a large number of messages published in order to promote the institution. The phenomenon indicates the tendency of the inspectorates to use Facebook pages predominantly for creating an online institutional brand. As far as user engagement is concerned, promotional messages have the highest degree of commitment.

Risk communication is the second category of content by frequency of publication. Most messages in this category relate to the everyday risks that predominantly summarize the

interventions that have taken place, and real-time information is less frequently used in this context. In contrast, messages about emergency interventions generated by natural hazards are divided almost equally between messages summarizing interventions that have been completed and informing users in real time. During real-time emergencies, real-time information is published on the evolution of situations and response measures taken by inspectorates or other institutions with different risk management capabilities. These real-time messages have a high level of commitment among users. Also, during emergency situations arising from natural hazards, dissemination of **information on self-protective measures** has often been carried out. This is important because social network users are more likely to seek this information during dangerous events (Ripberger et al., 2014).

With regard to **awareness raising and risk education** through Facebook pages, most messages contain safety measures in the case of natural hazards, indicating that the inspectorates' effort is more focused on education in the case of natural hazards. However, messages containing practical tips for reducing everyday risks or providing first aid have a higher degree of commitment among users.

At the same time, the results of the study show that disaster risk communication occurs especially after an emergency situation generated by a natural hazard took place. Common activities related to disaster risk communication in these situations include communication objectives at different stages of disaster management. In the preparedness phase, especially in the context of hydrometeorological phenomena, warnings are often disseminated, but the commitment of users was very low for this information. A more effective strategy to convey these warnings was observed in the case of heatwave warnings, in the sense that messages published to alert the population about this phenomenon were coupled with practical advice on how citizens can reduce their negative effects. To this end, in addition to the dissemination of warnings, it is advisable to include advice on the behaviors on which they can act.

Furthermore, the results of this paper have shown a connection between the users' engagement to the messages about the natural hazards and the types of risk that they refer to. In this regard, users have a greater engagement to messages about natural risks with a higher probability of occurrence (e.g. severe meteorological phenomena, wildfires and floods) than to those with a low occurrence probability (e.g. earthquake). This result brings to light a worrisome aspect of how users interact with content that promotes earthquake preparedness behavior.

Despite the fact that there is a strong focus on increasing citizens' knowledge about earthquake preparedness, with campaigns dedicated to this topic at national level, messages regarding this topic are disseminated through Facebook less often and without achieving a high level of engagement among users.

In conclusion, the present study provides an overview of how Romanian emergency management institutions use Facebook for disaster risk communication. Based on the results, several recommendations can be developed to improve the communication strategy through this platform.

Facebook as communication channel within emergency management institutions
- from perception to practice

This study provides a detailed insight into the personal attitudes of people with responsibilities in managing emergency situations in Romania to use Facebook to communicate disaster risk.

The study, based primarily on a qualitative analysis involving 44 respondents, reports a positive attitude towards adapting the platform for communication activities within these institutions. Favorable attitudes were mainly recorded for communication activities related to the promotion of institutional brands and the dissemination of messages in a rapid manner to a large number of people.

In the context of disaster risk communication, the best seen communication activities concerned awareness raising and education. This favorable perception can also be a reason why the inspectorates for emergency situations focus largely on preventive education through their communication effort.

Also, informing users of in-progress interventions or interventions that have taken place has been considered a particularly useful activity through this platform. All these activities are put into practice by respondents as administrators on institutional pages.

In terms of content monitoring activities of user-generated content either permanently or during an emergency situation, they were not considered as useful as the previous ones. In this respect, Facebook is used by the inspectorates for emergency situations primarily to disseminate

messages directly to citizens without filtering them from other people or institutions. Similar results have also been reported through other studies (Mergel, 2014; Reuter et al., 2016).

But while the possibility of addressing the public directly was considered one of the most important advantages offered by Facebook, the communication strategy pursued by these institutions rarely goes beyond the dissemination of messages, to involve the audience in a dialogue. In this respect, it was observed that, although most of the respondents had a positive attitude towards dialogue, this activity was rarely put into practice. Citizen relationship management is the most common bidirectional communication activity. Sometimes communication in a private setting is preferred (Lüge, 2017), and many of the emergency inspectorates provide users with this possibility. The results of this study indicate that administrators often respond to private messages sent by users, a particularly important aspect considering users expecting a quick response from emergency services (Reuter & Spielhofer, 2017). Active participation in discussions in the comments section of posts, another activity designed to maintain a dialogue with the audience, is less used. Also, initiating discussions by asking questions to users is rarely practiced by respondents. However, it should be noted that the latter activity is especially recommended in the context of disaster risk communication through several international guidelines, both to increase users' commitment to information about hazards and risks (CDC, 2015; Gizikis et al. , 2017), and to develop a relationship of proximity and trust with Facebook users (Lüge, 2017).

The results further indicate that the lack of resources needed to manage Facebook institutional pages, especially human resources, is one of the most significant challenges perceived by respondents. Managing these pages is, in most cases, an additional activity in the staff daily agenda, and managing a page can be time-consuming. The most difficult activities in this regard are to prepare and illustrate the messages, adapt them to the platform, comment management, and monitor user-generated content. The allocation of human resources is also a recognized challenge in several international institutions (Latonero & Shklovski, 2010; Reuter et al., 2016).

Another aspect that was considered by the respondents to be difficult is the management of rumors and negative opinions towards institutions. High exposure to users is seen as one of the most significant drawbacks that may result in serious threats to the institutional brand.

In conclusion, this study provides a first insight into how Facebook usage by inspectorates for emergency situations is perceived by individuals within these institutions. Investigating and understanding these attitudes is important because it helps to identify both the potential of the platform for communication and challenges in their effective adoption, anchored in the national and local context of Romania.

Conclusions, personal contributions and future perspectives

This paper proposes an original approach to analyzing how emergency management institutions use Facebook to communicate with Romanian users. The personal contributions made through this work are:

➢ Literature review on the development of the disaster risk communication field
➢ Literature review on how social media platforms are used to communicate disaster risk, both by emergency services and by the general public;
➢ A detailed analysis of the legislative framework on disaster risk communication in Romania, along with the presentation of the main preventive information activities supported by emergency inspectorates over the last years;
➢ Development and application of a coding agenda for the classification of the different categories and subcategories of messages published on the Facebook pages of emergency management institutions;
➢ Applying an engagement matrix to investigate how Romanian users interact with the messages posted on the Facebook pages of emergency management institutions;
➢ Developing and applying a questionnaire to investigate the attitudes and practices of using Facebook pages;
➢ Interpreting the results obtained to identify the main trends, both in terms of institutional communication and disaster risk communication through Facebook pages in Romania;
➢ The development of good practice recommendations that can be used in the future to develop effective communication strategies in this field.

The studies presented through this paper also provide a starting point for analyzing this phenomenon in detail. In the future, it would also be interesting to look at the secondary reaction

of these users to this information. Such an approach could be useful in understanding what messages have a high potential to encourage behavioral change among users to adopt security measures against different natural hazards. Once these issues are identified, effective disaster risk communication campaigns based on user needs can be developed.

Also, the research tools developed in this paper can be used in the future to identify risk communication trends and other institutions besides emergency inspectorates. In addition to other public institutions that have attributions in the management of natural risks in Romania, it would also be interesting to follow the disaster risk communication trends of other institutions with attributions in the field.

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