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Understanding Evolving Organisational Issues in Social Media

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ABSTRACT

The aim of this dissertation is to better understand the spread of issues in social media, a relatively new phenomenon that is not fully understood in academia. The phenomenon has also captured the interest of organisations, as it may cause or coincide with organisational crises. Following issue spread is not easy, as issues emerge in dynamic interaction amongst many actors who are engaged in voluminous debate within varying media environments.

This research was based on insights from different disciplines – in particular, communication sciences and information systems. It utilised quantitative, qualitative and mixed methods. Literature reviews provided a solid basis, whereas various cases provided empirical datasets for analysis. Five studies were conducted and reported in seven articles.

The studies clarified the process of monitoring and described factors that influence issue spread. Their findings contribute to capturing and interpreting issue patterns online. Examples of cases studies are the lost aircraft of Malaysia Airlines, and the Volkswagen emission crisis. Twitter and Facebook data were collected and analysed for this research, together with some other real-time media data. Frequency graphics over time showed the lifecycle of an issue and pointed to issue transfer between news and social media. Within crisis discourse, various lifecycles of (sub) issues were revealed. Moreover, the level of interactivity and strategies of crisis response by a focal organisation were scrutinized.

Issue spread in social media can only be understood by acknowledging its complexity. Therefore, this research offers a comprehensive approach to explain how issues evolve in social media, as a result of interaction by multiple actors with multiple purposes, using multiple strategies in multiple interrelated media.

Keywords: social media, issues management, issue arena, Facebook, Twitter.

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FIGURES

TABLES

CONTENTS

ORIGINAL PAPERS
1. Social media monitoring - Aims, methods, and challenges for international companies
2. How and why some issues spread fast in social media
3. Understanding fast diffusion of information in the social media environment: A comparison of two cases
4. Decomposing issue patterns in crisis communication - The case of the lost airliner
5. Online stakeholder interaction of some airlines in the light of situational crisis communication theory
6. The issue arena of a corporate social responsibility crisis - The Volkswagen case in Twitter
7. Volkswagen emission crisis - Managing stakeholder relations on the web

1 INTRODUCTION

Nowadays organisations function in a social environment that is very dynamic. They need real-time monitoring to follow online discourse on issues relevant to their operations. Understanding the course of the debate and how it may develop provides them with opportunities to build sustainable relations with various kinds of stakeholders.

This study clarifies how information spreads in the social media environment, and what organisations can learn from this for issues and crisis management purposes. This is does not only benefit organisations but is also of societal value. The research also contributes to academic insights on fast spreading co-constructed societal issues.

The research focuses on issues and crises that concern organisations and their stakeholders, as discussed in the public debate on social media platforms, particularly Twitter and Facebook. It takes the perspective of social media users into account and acknowledges that online interaction takes place in multi-stakeholder issue arenas. The focus is on following the development of the content and the intensity of social media discourse over time.

1.1 Research problem and aim

The fast spread of issues in online interaction poses problems for organisations. It creates dynamics in the external environment that cannot be controlled by the focal organisation. Organisations try to follow the discourse in social media and observe issue development, for example, in evolving crisis situations. However, the spread of issues online is a complex phenomenon that is *not yet well understood*, as multiple actors interact around issues they have a stake in, on various platforms, thus influencing the course of the debate.

Additionally, now that there are so many data available, this raises the question of *how one can interpret* monitoring results and use the available data for strategy making. Social media monitoring results can, for example, be pre-

sented in frequency graphs. To interpret these, it would be helpful to know what kinds of patterns evolve in different types of crisis, how they can be deduced and what to look for in the patterns found.

Therefore, this research focuses on online issue dynamics and aims at a better understanding of how issues spread in social media. This advances issues and crisis management as part of corporate communication, and contributes to theory development on communication in online issue arenas.

After clarifying the theoretical basis, detailed research questions for the empirical work will be provided in section 3.2.

1.2 Fast spread of issues in online interaction

The impact of the spread of issues has been investigated for several decades in social sciences (e.g. Downs, 1972; Hallahan, 2001), but initially related to public debate in the news media. The online environment creates possibilities for even faster issue spread, as investigated in social sciences as well as information systems and computer science (Biggs, Lloyd & Wilson 1976; Wellman & BerKovitz, 1988; Aggarwal, 2011; Veijalainen, Semenov & Reinikainen, 2015). Issue spread gained attention since Granovetter (1973) published his well-known social network analysis on weak ties, low strength network links. Various social media have been investigated. In Facebook, a friendship-based strong tie network, chat platforms have been addressed with attention for hot topics. Comparatively, Twitter attracted news attention as a weak tie based tool. The different characteristics of the tools make it hard to generate a standard procedure for accessing the spread of issues.

In communication sciences, fast issue spread was called issue contagion by Coombs (2002) and was acknowledged to have changed the communication climate in which organisations function, calling for monitoring of online issues. How to monitor and foresee the development of online interaction is still a challenging question. New approaches, such as multi-actor communication in issue arenas, may help investigate the interaction of stakeholders regarding a specific issue and open new ways to study the role of online actors in evolving online debate.

Overall, this research contributes to the process of interpreting online discussion as a basis for issues management and crisis communication. It outlines the importance of monitoring and seeks to address the spread of issues in various ways. How does the spread of issues take place in the online environment, and which characteristics of issues and of the different social media explain how an issue spreads? Online interaction is investigated with an eye for *evolving (sub)issues in the course of the debate*. Understanding issue spread is not only relevant for issues management, but also for crisis management. During the lifetime of a crisis, multiple issues grow and die out in time, calling for a comprehensive response.

1.3 Thesis structure

This dissertation investigates the spread of online issues in social media from the perspective of organisations, as an article-based thesis. Table 1 lists a brief overview of the five studies conducted, investigating issue spread from different angles and reported in a total of seven articles. Per study the central topic and title of the related articles are given.

TABLE 1   Brief overview of the studies

Study I (1 article)	Monitoring social media • *Social media monitoring - Aims, methods, and challenges for international companies.*
Study II (1 article)	Issue spread in social media and issues management • *How and why some issues spread fast in social media*
Study III (1 article)	Spread patterns and issue transfer in crisis situations • *Understanding fast diffusion of information in the social media environment: A comparison of two cases*
Study IV (2 articles)	Issues evolving during a crisis • *Decomposing issue patterns in crisis communication – The case of the lost airliner* Crisis communication strategies • *Online stakeholder interaction of some airlines in the light of situational crisis communication theory*
Study V (2 articles)	Complexity of multi-actor online interaction • *The issue arena of a corporate social responsibility crisis – The Volkswagen case in Twitter* Role of the main actor in interaction • *Volkswagen emission crisis – Managing stakeholder relations on the web*

The studies roughly followed the chronological development of the learning process of the researcher. The first two studies were based on preparatory structured literature reviews. Study I introduced the perspective of organisations that have different reasons for monitoring and for whom the process is challenging, using a structured literature review. Study II presented insights on issue spread in the literature and brought these together in a model from an organisational issues management point of view.

Studies III-V comprise the empirical research. Study III was a first attempt to compare spread patterns on Twitter for two different cases that evolved in 2013: the issue of the Arctic Sunrise, involving Greenpeace, and the U.S. capitol shooting. In addition, issue transfer between news media and Twitter was looked into. Study IV investigated the case of MH370, the airliner lost in 2014, on Facebook, and tried to break down the spread pattern into sub-issues, as this facilitates strategy decisions. It also linked to crisis communication strategies. Study V took the example of the VW crisis that began in 2015 to look at the pattern occurring, mostly focusing on Twitter. It also checked the reply strategies of the focal organisation. The last two studies were reported in a core article and a second additional article.

Gradually, the studies added complexity, to gain a deeper insight into issues discourse in social media, and how evolving issue patterns may help understand the multi-actor interaction process and support organisational strategy making. The studies are further explained in section 3.1.

To increase understanding of online issue spread and how online issue discussion can be interpreted using monitoring results, the text of the dissertation shell is structured into various parts (see Figure 1).

Theory
- Online spread of issues
- Issues in organisational context
- Issues management and crisis communication of organisations
- Communication in issue arenas

Methods
- Qualitative research
- Quantitative research
- Mixed-methods research

Findings
- Aims and methods of social media monitoring
- Understanding spread patterns and factors affecting the spread of organisational issues
- Comparing spread patterns and investigating issues transfer
- Decomposing issues over time in crisis and strategymaking
- Understanding the complexity of online interaction

End
- Discussion and analytical model
- Conclusions
- Articles in full text

FIGURE 1   Schematic overview of the dissertation shell

In the dissertation shell, first, the theoretical basis of the studies is clarified, followed by the design of the research and an overview of the findings. Finally, the discussion chapter presents a conceptual model that brings the insights gained together and discusses the limitations of the conducted research, and the conclusion chapter describes the main contribution of the dissertation and future research directions. The full text of the seven articles follows.

2 THEORETICAL FRAMEWORK

In this chapter, the theoretical framework for the research is clarified, focusing on the spread of issues from the perspective of issues management and crisis communication as a part of corporate communication. The conceptual framework specifies the core concepts and key sources.

2.1 Core concepts

This section briefly introduces the core concepts to clarify the topic of this dissertation. Table 2 lists the main concepts, including issues, issue arenas, social media, monitoring, and related concepts. It facilitates the reading of the next sections; other concepts may be used and will be explained in the following sections.

The work focuses on evolving issues, communication in issue arenas and, in particular, social media as spaces for the interaction. As this dissertation is about the spread of issues, this relates to social media monitoring. In addition, stakeholders, public debate and networks are relevant concepts here. From the organisational perspective, the concepts of corporate communication and issues management are important. Issues may come up before and during organisational crisis, making organisational crisis and crisis communication relevant concepts too. The core concepts are briefly explained in Table 2. They will be discussed further in the next sections.

TABLE 2   Conceptual framework

Concept	Initial explanation	Discussed in
Issue	considered a controversial topic that raises public attention, often defined from the perspective of an organisation regarding its negative aspects as problems, as a longer-term issue could tie up to an organisation or deepen a reputational crisis (Heath & Palenchar, 2009)	2.3.1
Issue arena	space for communication among multiple actors where an issue is constructed and discussed in different media platforms (Vos, Schoemaker & Luoma-aho, 2014), and actors are competing for attention pertaining to a certain issue (Luoma-aho & Vos, 2010)	2.5.1
Stakeholders	public groups that have a stake or interest toward the specific organisation; important as stakeholder relations impact the development of the organisation (Freeman, 1984)	2.3.2
Public debate	interaction in the public sphere where issues are discussed and put on the agenda to create understanding, influence, negotiate or solve problems (Vos, Schoemaker & Luoma-aho, 2014)	2.5.2
Network	a set of interconnected nodes that process flows, which are streams of information connecting two or more actors, individuals or organisations (Castells, 2000)	2.3.2
Social media	internet-based applications that enable the creation and exchange of user-generated content in Web 2.0 (Kaplan & Haenlein, 2010)	2.2.1
Social media monitoring	a listening process, comprising information gathering and interpretation of social media interaction (Rappaport, 2010)	2.2, 2.3.1
Sentiment analysis	a text mining technique that aims at accessing the polarity of text, including positive, neutral and negative messages (Agarwal & Bhattacharyya, 2005; Taboada, Brook, Tofiloski, Voll & Stede, 2011)	3.3
Corporate communication	the interface and management function between an organisation and its stakeholders, including internal and external communication (Christensen, Firat & Torp, 2008)	2.3.2
Issues management	emphasizes public policy and decision-making processes concerning issues that af-	2.4.1

	fect organisations and vital stakeholder relationships (Crable & Vibbert, 1985; Veil, Petrun & Roberts, 2012)	
Organisational crisis	a disruptive event that can have a profound effect on stakeholders and organisational operations, triggering reputational and financial losses (Mitroff, 2005)	2.4.2
Crisis communication	an organisation's interaction to maintain stability of stakeholder relations in crises or conflicts (Darling, Ollikainen & Nurmi, 1996)	2.4.2

The concepts are interrelated. Communication about issues takes place in issue arenas, where the issue rather than the organisation is central. Stakeholders can be more or less active in the discussion. Analysis of public debate shows linkages in the network of actors. Here the focus is on the dynamics of discussion in social media. Social media enable fast issue spread that calls for social media monitoring. Next to frequency analysis over time, this also involves sentiment analysis. Within corporate communication, issues management focuses on issues as an early warning for organisational crises. If an issue turns into a crisis, this may be followed by crisis communication. A more in depth explanation follows in the next chapters.

The main theoretical approaches are indicated in Table 3, as a starting point along with some key sources that have contributed to this study.

TABLE 3   Theoretical approaches

Theories	Key sources
Issues	Hallahan (2001); Bridges (2004); Heath and Palenchar (2009); Boon, Cottrell, King, Stevenson, and Millar (2012)
Social media monitoring	Bridges (2004); Bengston, Fan, Reed, and Goldhor-Wilcock (2009); Rappaport (2010)
Public debate	Heath (1998); Coombs (2002); Kaplan and Haenlein (2010); Meriläinen and Vos (2011); Wang (2012)
Issue arenas	Luoma-aho and Vos (2010); Luoma-aho, Tirkkonen and Vos (2013); Vos, Schoemaker and Luoma-aho (2014)
Stakeholder theory	Freeman (1984); Billington and Billington (2012); Freeman and Moutchnik (2013); Coombs and Holladay (2015)
Network theory	Biggs, Lloyd, and Wilson (1976); Granovetter (1985); Wellman and Berkowitz (1988); Castells (2000); Zhao, Wu and Xu (2010); Aggarwal (2011); Michaelidou, Siamagka and Christodoulides (2011); Li and Shiu (2012); Stieglitz and Dang-Xuan (2013)
Issues Management	Crable and Vibbert (1985); Renfro (1993); Heath and Coombs (2006); Heath and Palenchar (2009)
Crisis communication	Pauchant and Mitroff (1992); Benoit (1995); Darling, Ollikainen and Nurmi (1996); Fearn-Banks (1996); Pearson and Clair (1998); Mitroff (2005); Coombs (2007a); Hiltz, Diaz, and Mark (2011)

Scholars have underlined the impact of issues on organisations and the importance of social media monitoring. Public debate has been investigated and issue arena theory introduced. As a basis for the latter, the stakeholder approach, network theory, and issues management have been suggested. In crisis communication, interaction with stakeholders is considered vital to the focal organisation. This will be further explained and elaborated on in the next sections.

2.2 Online spread of issues

The internet has changed the way organisations communicate with stakeholders. The growth of an issue online outlines a new approach to the development of an organisation in WEB2.0 nowadays, emphasizing monitoring activities to evaluate online interaction. Social media have become the nurtured soil for issue contagion, which changes how organisations assess and prioritise issues (Coombs, 2002).

2.2.1 Communication in social media

Social media have been investigated as internet-based services showing communication patterns, or patterns of interaction (Chou et al., 2009; Rappaport, 2010). Classification and clustering of the spread patterns in social media raised attention in recent studies (e.g. Coombs, 2002; Banerjee & Agarwal, 2012), as has the text mining technique, which has been commonly used to reveal the content of interaction (Fogel, 2010; Pehlivan et al., 2011). The complexity of online discussions challenges corporate communication (Luoma-aho & Vos, 2010). By allowing for user-generated content, social media enable fast information sharing and interaction, thus creating platforms for potential fast growth of issues.

Social media provide a media format for making *connections* (Cain, Romanelli & Fox 2010). They can be used to coordinate activities through interaction, generate multi-media content and share it globally (Li & Shiu, 2012; Stieglitz & Dang-Xuan, 2013; Sykes & Travis, 2012), with unique interest groups/virtual communities as a dynamic field (Cervenková, Šimek, Vogeltanzová, & Stoces, 2011; Coombs & Holladay, 2012b; Stieglitz & Dang-Xuan, 2013).

There are different ways to *categorize* social media platforms, for example: blogs (Blogger); microblogs (Twitter); social networks (Facebook, WhatsApp); video sharing (YouTube, Vimeo, Dailymotion, Liveleak, Veoh); image publishing (Instagram, Imgur, Flickr, Photobucket, TinyPic, Snapfish); dialogues (Skype, Messenger); forums (Suomi24, Finland Forum); and so on. Moreover, Kaplan and Haenlein (2010) categorise social media by their level of media richness and potential for self-disclosure of users. Social media are also called Social Networking Sites or Social Networking Services (SNS) (Michaelidou, Siamagka & Christodoulides 2011; Borge-Holthoefer, Rivero & Moreno, 2012; Stieglitz & Dang-Xuan, 2013; Byron, Albury & Evers, 2013).

Social media have increasingly gained the interest of diverse groups of *researchers* (Borge-Holthoefer, Rivero & Moreno, 2012), who carry out, for example, studies of path length, clusters, nodes, interrelations, or scale-free networks (Biggs, Lloyd & Wilson, 1976; Wellman & Berkowitz 1988). Graph theory has been widely applied to the social networks modelled by social media platforms (Biggs, Lloyd & Wilson, 1976; Scott, 2012).

Based on their content, social media have been discussed considering their knowledge-sharing aspect and networking building aspect (Zhao, Wu & Xu 2010). They have also been investigated from the connection angle, as social networks contain weak and strong ties (Zhao, Wu & Xu, 2010; Anderson, 2011; Hiltz, Diaz & Mark, 2011). Moreover, their impact on society has been critically scrutinized by researchers. Media events may, for example, have a disruptive nature that challenges social cohesion (Sumiala, Tikka, Huhtamäki & Valaskivi, 2016).

2.2.2 Spread patterns in the online environment

Compared to traditional media, the spread patterns in social media have unique characteristics. Hiltz, Diaz and Mark (2011) claim that social media are used to publish real-time information, and broadcast events live with location-specific info. From an organisational perspective, social media help organisations maintain contact and profitable relationships with customers (Sinha, Subramanian, Bhattacharya and Chaudhary, 2012). Moreover, real-time interaction with organisations on major social media platforms (Facebook and Twitter) has been commonly used for customer service (Elefant, 2011).

Another characteristic of social media platforms is the *ease of sharing* information and, in particular, producing *user-generated content*. Organisations are increasingly influenced by customers' electronic word-of-mouth (Bulearca & Bulearca, 2010; Stieglitz & Dang-Xuan, 2013), and customers can immediately share their experiences of products or services online. The focus is on how users interact, potentially producing relational outcomes (Valentini, 2016). Online social communities or virtual communities are created by groups of people who share the same interests (Fernando, 2010). This enables fast interaction where users can get immediate replies and discuss topics (Divol, Edelman & Sarrazin, 2012; Rinaldo, Tapp & Laverie, 2011; Wang, 2012). However, this assumes that one is being found on the web, which depends on search engines and previously made links as follower or other network connections. Additionally, it should be acknowledged that some communities are closed (e.g. WhatsApp), while others are openly accessible (e.g. Twitter).

2.3 Issues in an organisational context

In the social media environment, corporate communication has changed over the last decades. The speed of information spreading has increased online, in-

cluding rumours and negative electronic word-of-mouth, motivating organisations to monitor online discourse. In this chapter, some theoretical background is provided on issues and their analysis from an organisational perspective.

2.3.1 Issues

Coombs (2002) explains that an issue begins to exist when a personal concern is voiced *in public*. An issue is a problem or unsettled matter (Crable & Vibbert, 1985), that gains attention to become a topic of public concern. Issues are socially constructed and opposing viewpoints show up in the debate (Hallahan, 2001).

When attention is drawn to an issue and its salience increases, the issue can grow and *transfer* from the public agenda to the news media and political agenda (Vos et al., 2014). Agenda-building makes issues visible and provides a context to understand the issue (Hallahan, 2001).

Literally speaking, issues are regarded as a neutral form, in researchers' point of view. They are investigated in a social context (Hallahan, 2001) when referring to issues discussed among multiple-actors, or in an organisational context and within the organisation-stakeholder relationship (Coombs, 2002). An issue may be initiated by an organisation seeking *societal change* (Crable & Vibbert, 1985), for example, a non-governmental organisation raising attention for human rights, or a company advocacy campaign for changes in regulations. However, organisations can also be the *object* of an issue raised in public. In the literature, often issues are considered as related to organisations, representing a problem or concern for strategic business planning (Heath & Palenchar, 2009).

Issue activation relates to a concern being voiced and gaining broader attention, while issue response involves the target at which it is directed, for example, an organisation (Hallahan, 2001). Issues are *dynamic* and their growth can be depicted as a life cycle, as they grow and die out over time. In the phase of crisis, an issue reaches the highest intensity with frequent media coverage (Meng, 1992). As to media coverage, Downs (1972) proposed the "issue-attention cycle" that explains how public attention grows to prominence and fades, including a pro-problem phase, alarmed discovery, realizing the cost of significant progress, decline of public interest, and a post-problem step (Downs, 1972).

In recent years, the emergence of social media changed the available media formats and became a popular way of communication. This increased the pace of issue spread, called issue contagion (Coombs, 2002), as well as the likelihood of high media coverage resulting in a high level of intensity of issue debate. Problems gain transparency, as the public may note a problem voiced online sooner than before. This adds pressure, but also opportunities for organisations.

Organisations *monitor* media coverage to gain an understanding of trends in their environment and to follow changing consumer preferences, identifying business opportunities and reputational threats. By identifying reputation-related issues early, organisations gain time to consider a wider range of alternative response options and avoid formal constraints (Meng, 1992). The analy-

sis also helps organisations understand the issue's potential consequences and impact.

Organisational issues may, for example, relate to problematic performance, less efficient behaviours, disputed allocation of resources, or problems in communication (Bridges, 2004). This calls for abilities to deal with issues within the organisation and to enhance resilience (Boon et al., 2012).

2.3.2 Organisations and issues

Freeman's stakeholder approach (1984) emphasized the importance of building relationships with customers and other stakeholders, acknowledging the environmental and societal responsibilities of organisations. Inspired by the stakeholder approach, scholars categorised stakeholders, for example, as follows (Billington & Billington, 2012): internal (CEO, managers, employees, engineers, sellers); external (suppliers, customers); governing (shareholders, governmental organisations); and public (general public, industry).

According to the stakeholder approach, different groups may have a stake in organisations. So, stakes are commonly seen from an organisational point of view. However, seen from the perspective of users of online media, organisations may not be the focal point. Therefore, it has been suggested that people, rather than focusing on organisations, may feel connected to issues. Similarly, organisations may also have a stake in issues related to their operations. Thus, people are expected to primarily be interested in and have a stake in issues (Roloff, 2008), and these issues may or may not link to organisations.

Organisations are currently seen as less central than the familiar picture of an organisation surrounded by its stakeholders suggests. In the online environment, organisations have less control (Pierpoint, 2011; Veil et al., 2012). They are one actor among many in the *network*. In an actor network, the nodes may have different roles and more or less communication power. A network has a number of central hubs that are well linked to other nodes (Wellman & Berkowitz, 1988). In social media, this can involve influential users with many followers that may function as gatekeepers in the network, facilitating or blocking issue spread (Gruzd, Wellman & Takhteyev, 2011; Newsom & Lengel, 2012). Earlier, the concept of issue networks was used to describe pluralist societies where groups compete for media attention and societal influence (Grunig & Jaatinen, 1999).

Roloff (2008) suggests a multi-stakeholder network approach to collaborate with relevant actors from business, society, government, and so on. In addition, network approaches have caught organisations' attention in value chain communication. Supply chain and logistical operations utilize their broad communication networks to observe the market (Rinaldo et al., 2011) and forecast trends (Nadeem, 2012). Thus, organisations have been seen to function within actor networks but, also, their external and internal environment has been described from a systems perspective, as will be further explained.

To understand the organisational environment as an ecosystem, systems theory was introduced, explaining the functioning of organisations pluralistical-

ly in a postmodern context (Boje, Gephart & Thatchenkery, 1996). Dooley (1997) formed the theory of complex adaptive systems to clarify the compound organic-like structures of order as a system. As to the structure, Manson (2001) stated that systems theory reviews entities with linear relationships to link the diffusion of information. Systems can also be regarded as a single model of operation (e.g. online communication) (Luhmann, 2006).

Grunig (1975) developed multi-systems theory to explain complex communication behaviour and to describe communication by an organisation in an integral way, including its relations with multiple organisations and stakeholders. Corporate communication is considered an interface function that connects the organisation with its environment (Christensen, Morsing & Cheney, 2008), and similarly connects the sub-systems that occur within organisations. The borderline between organisation and environment is fluid. Issues discussed outside the organisation may be discussed also by employees, who also may participate in social media interaction about issues.

2.4 Issues management and crisis communication of organisations

Literature on issues management has shed light on the impact of negative issues on organisations and the life-cycle of issues. At the centre of this chapter is the growth of an issue into a crisis. With the characteristics of a long extremely negative process, crises have exerted intense impact on the performance of organisations and related stakeholders. Crisis communication literature advises organisations to safeguard their reputations and to take measures based on various crisis situations.

2.4.1 Issues management

Within organisations, *strategic policy making* concerning issues involves the issues management function (Renfro, 1993). Issues management is public policy making by an organisation. Heath (1998) stated that issues management uses strategic communication to maintain a balance between organisations and the public. Subsequently, issues management advances organisational benefits by enhancing stability in stakeholder relations (Heath & Coombs, 2006).

Petty (2012) states that issues management opens up early warning strategies on the brand. For example, organisations can utilize search engines to *monitor* discourse on brand image or issues that relate to organisational policies. Timing is vitally significant in issue management, and real-time monitoring in social media provides a valuable source of information for organisations to react effectively when encountering issues (Coombs & Holladay, 2012a). Therefore, organisations should monitor social media in the context of a crisis to observe public perceptions (Schwarz, 2012).

Issues management, for example, includes issues related to sustainability. Irresponsible behaviour that causes environmental and societal problems may lead to reputation loss and financial damage. Corporate social responsibility (CSR) provides possibilities for organisations to behave responsibly beyond profitable relationships (Freeman & Moutchnik, 2013). However, CSR can also become a problematic issue for the organisation, as a CSR challenge may arise when organizations cannot deliver what they have promised (Coombs and Holladay, 2015). When an organisation-related issue grows, it may turn to a crisis for the organisation. Issue discussions are dynamic, and when a crisis evolves various (sub) issues may be discussed over time.

2.4.2 Crisis communication of organisations

Pauchant and Mitroff (1992) define a crisis as a process initiated by a triggering incident and followed by conflict. Fearn-Banks (1996) approaches a crisis as an occurrence with negative consequences to the focal organisation. This is similar to Mitroff (2005), who describes organisational crises as extreme events that damage organisational reputation and bring financial losses. Benoit (1995) and Coombs (2007b) also mention financial and reputational losses as a result of crises, and adds attention for negative impacts on stakeholders. Severe reputational crises may impact not only the focal organisation but also related organisations, shareholders and employees, whereas other types of organisational crises, such as accidents in production, may have an even broader impact.

Crises may be depicted as negative events, but they also bring chances for organisational *learning* and improvement (Coombs & Holladay, 2012b). Organisations can minimize reputational losses and avoid similar crises in the future, by utilizing response strategies developed for various crisis types and constructing recovery plans (Coombs & Holladay, 2014) that may involve, for example, a product recall and public apology.

Furthermore, crises cannot be completely prevented, which calls for organisational resilience. Vogus and Sutcliffe (2007, p. 3418) explain organisational *resilience* as "the maintenance of organisations under adversity, strain and barriers", which can be regarded as challenging conditions. Organisational resilience deals with broader circumstances for organisations to maintain continuity of operations and respond flexibly to achieve their goals.

Organisational crisis communication, as a discipline, provides procedures to avert crises by taking effective measures (Pearson & Clair, 1998), for example, procedures to identify and monitor issues related to organisations and to prevent or reduce losses in reputation (Darling et al., 1996). Similar to issues monitoring that aims to prevent crises, crisis communication strives to understand public opinions and feedback on the crisis response by the focal organisation (Schwarz, 2012). In the case of, for example, industrial accidents or product failure, crisis communication supports crisis management in reducing harm to people and the environment, and in learning from what happened.

In reputational crises, the *expectations* of stakeholders are not met by the focal organisation. This may begin as a reputational threat, which can, for ex-

ample, be a para-crisis caused by perceived unethical or irresponsible behaviour (Coombs & Holladay, 2012a). Because a reputational threat may grow into a reputational crisis, monitoring issues can help organisations to notice threats at an early stage and to prevent or limit negative consequences by taking appropriate organisational actions.

In the case of crises, different *response* strategies can be chosen. As to standards for effective measures, situational crisis communication theory (SCCT) has been developed by Coombs (2007c). Based on attribution theory and the earlier work of scholars like Benoit on image repair strategies (e.g. Benoit & Brinson, 1995), it provides recommended strategies for different crisis situations, such as when the organisation is a victim, when there is an accidental connection of the organisation with the crisis, and when the situation could have been prevented by the organisation (Coombs, 2007c).

SCCT focuses on single solutions per type of crisis situation. However, complex evolving crises may require adjustment and multiple solutions. In addition, SCCT focuses on reputation damage and responses to attribution of blame. Meanwhile, other types of crisis, such as product failure or production accidents, also call for measures to reduce damage and harm to stakeholders.

Discussion on issues during crises can be studied from the perspective of communication in issue arenas. Also, at an early stage before an issue turns into a crisis, this approach invites to analyse evolving multi-actor interactions over the course of the debate.

2.5   Communication in issue arenas

Issue arenas are traditional and virtual spaces for debate on issues. Traditional spaces include newspapers, radio and television, while virtual spaces comprise digital media such as websites and social media. Together, they represent the dynamic environment in which organisations currently function. The dynamics are especially clear when it comes to the fast exchange of views in real-time media.

2.5.1   Issue arena theory

The concept of issue arenas is proposed to lead to a more dynamic stakeholder approach. It does not place the organisation at the centre but as a node amongst dynamic networks. Issue arena theory does not emphasize bilateral relations between an organisation and each of its stakeholders, but rather focuses on *multi-actor* communication between organisations, groups and individuals. Thus, it acknowledges the current complexity of multi-actor issue debate. It also highlights the *dynamics* of online communication (Luoma-aho & Vos, 2010).

Issue arena theory offers an overall point of view to analyse issues in social media. It proposes to study issue arenas integrally from four major perspec-

tives: issues, actors, media and course of debate (Vos et al., 2014). The following elements are considered relevant to include in research design:

- Identifying issues discussed and relevant sub-issues.
- Categorizing multiple actors active in the debate, and their roles and interests.
- Analysing characteristics of multiple media that may be involved and network patterns.
- Capturing the course of the debate over time, identifying trigger events and multiple strategies used.

So far, issue arena theory has been applied in few studies and mostly this concerns online debate (e.g. Meriläinen, 2014; Luoma-aho, Tirkkonen & Vos, 2013).

2.5.2   Online debate

Social media have changed the ways of communicating and thus influenced public debates (Keelan et al., 2010). Social media are used to attract attention and are regarded as fertile soil for users to participate in the public debate (Meriläinen & Vos, 2011). With its characteristic of viral spreading, debate in social media has been brought into focus in issue management (Luoma-aho & Vos, 2010). Although there is a commenting function, in social media the debate often takes the form of an expression of multiple opinions without becoming a dispute that directly confronts opposite points of view. However, through sharing, for example by re-tweeting, some views may be amplified and consequently spread fast. Organisations cannot avoid online debate concerning their products and services or policy making. Instead, they should be aware of public concerns and respond properly (Coombs & Holladay, 2012b).

An issue can be discussed in *multiple media* simultaneously. The discourse in one of these media may attract different participants and show a different development. Media monitoring usually brings together results for multiple media; however, organisations need to decide which media discussions to prioritize for active participation and consequently follow the results. An interactive participation strategy is recommended, although one-way messaging is predominantly used (Romenti, Murtarelli & Valentini, 2014).

The outcomes of a debate can be critical online (Vos et al., 2014). When this is the case for crisis communication, organisations should prepare response strategies to deal with various situations following multi-actor discourse online and offline.

2.6   Research gap and theoretical approach

Previous research has underlined the dynamics of communication in social media. Scholars have just begun to grasp how issues spread in social media. Additionally, insights into issues management and crisis communication have grown over the last decades in the field of corporate communication. However,

the fast spread of online issues is considered challenging. Earlier communication models do not seem to effectively fit this complex multi-actor communication and – while issue arena theory has been proposed as an approach to capture the current complexities – it has hardly been tested so far.

Therefore, many questions are still open. Many topics related to online issue spread are not yet well understood:

I. How issue spread over time is captured in social media monitoring

II. How and why some issues spread fast in social media while, in other cases, public attention shifts to the next issue

III. In what ways issues show different spread patterns and issue transfer among media

IV. How crises and issues can be broken down into sub-issues discussed online by stakeholders to facilitate strategy making

V. Hoe complexity of issue spread shows in multi-actor debate in social media.

This research set out to fill such gaps in a systematic approach from the growth of issues, timelines, media aspects, to organizational decision making. Based on the theoretical framework outlined, the research was directed by three themes: social media, issues management and crisis communication (see Figure 2).

FIGURE 2   Research approach showing the main themes and gaps

The three themes represent the main elements of the theoretical basis, whereas the arrows represent theories to help address the research gaps. Social media facilitates fast issue spread that poses major challenges for issues management and crisis communication. Current insights into these themes have provided a basis for further clarifying how issues evolve over time in the online environment. This will be specified for the five studies.

- Studies I, II and III are positioned between social media platforms and issues management to address *monitoring issue spread over time*. Issue arena theory provided inspiration for these studies, underlining issues, actors, media and debate.
- To address *decomposing issue patterns for responses*, Study IV emphasised issues occurring in social media from the perspective of crisis communication. Situational Crisis Communication Theory (SCCT) provided a framework to analyse responses.
- To address *analysing* interaction and strategies, Study V scrutinized online stakeholder interaction from the perspectives of both issues management and crisis communication. Background research into Corporate Social Responsibility from the reputation management perspective provided a context to understand the complexity of multi-actor communication.

The research combined insights from various disciplines, particularly communication sciences and information systems and computer science. The literature on social media and organisational issues shows different approaches that are also visible in the research reported in this dissertation. For example, in the literature on social media monitoring, when discussing the various aims of monitoring – from listening to influencing online debate – different approaches show up according to the sources (e.g. public relations, marketing or information systems). This research has adopted a pragmatic point of view, drawing on a variety of sources and approaches relevant to understand the current phenomenon of issue spread in social media. Combining approaches to reach new insights can be seen as *bricolage* (Weick, 2001), in which we construct work from a diverse range of available resources and viewpoints.

Functionalist approaches are visible in this dissertation and in the articles, as a model for bringing together factors that explain the pace at which issues travel. Such approaches are also taken into account when discussing response strategies, although this research mainly highlights interactivity and listening, and focuses on recognising issue patterns to help interpret online debate. Constructionist approaches are visible where crises and fast changes online are emphasised, and where public multi-actor debate is discussed. Consequently, mostly quantitative but also qualitative and mixed methods have been used.

In this dissertation, structured literature reviews were conducted to bring together insights in the different research fields and to enhance the basis for the research at the beginning of the process. Empirical data from many case situations were collected and analysed, concerning issues related to organisational crises. The research process developed from a focus on the monitoring of social

media, to the spreading of issues, spread pattern formation, and finally to issues in crisis situations with complex multi-actor interaction. The research approach is further explained in the next chapter.

3 RESEARCH APPROACH

This research is characterised by a multidisciplinary approach to the spread of issues in social media. The studies progress from monitoring social media, to the ways issues spread, to spread patterns, to responses in crisis situations, and to the complexity of online interaction. The purpose of the research is to better understand the spread of issues in the online environment, and, consequently, contribute to the interpretation of monitoring results for issues and crisis management. Supported by the theoretical basis described in the previous chapter, the empirical data gained in several studies helped provide insights for this. In this chapter an overview of the studies is provided, the research questions are presented, and the methods applied are explained.

3.1 Overview of studies

In this article-based dissertation, five studies are presented. Table 4 provides an overview of the studies and the research articles in which the results were presented.

TABLE 4   Overview of the studies and related research articles

Study I	**Monitoring social media**
Article 1	Zhang, B. and Vos, M. (2014), "Social media monitoring - Aims, methods, and challenges for international companies", *Corporate Communications: An International Journal,* Vol. 19 No. 4, pp. 371-383.
Study II	**Issue spread in social media and issues management**
Article 2	Zhang, B. and Vos, M. (2015), "How and why some issues spread fast in social media", *Online Journal of Communication and Media Technologies,* Vol. 5 No. 1, pp. 90-113.
Study III	**Spread patterns and issue transfer in crisis situations**
Article 3	Zhang, B., Semenov, A., Vos, M. and Veijalainen, J. (2014), "Understanding fast diffusion of information in the social media environment - A comparison of two cases", *In C. Genest (Ed.), CCI 2014: Proceedings of the Conference on Corporate Communication 2014,* Corporate Communication International, New York, pp. 522-533.
Study IV	**Issues evolving during a crisis**
Articles 4	Zhang, B., Vos, M. and Veijalainen, J. (forthcoming), "Decomposing issue patterns in crisis communication - The case of the lost airliner", *International Journal of Emergency Management.*
	Testing Situational Crisis Communication Theory
Article 5	Zhang, B., Kotkov, D., Veijalainen, J. and Semenov, A. (2016), "Online stakeholder interaction of some airlines in the light of situational crisis communication theory", *Proceedings of the 15th IFIF Conference on e-Business, e-Services and e-Society*, Springer, New York, pp. 183-192.
Study V	**Complexity of online interaction**
Articles 6	Zhang, B., Vos, M., Veijalainen, J., Wang, S. and Kotkov, D. (2016), "The issue arena of a corporate social responsibility crisis - The Volkswagen case in Twitter", *Studies in Media and Communication,* Vol. 4 No. 2, pp. 32-43.
	Role of the main actor in interaction
Article 7	Zhang, B., Veijalainen, J. and Kotkov, D. (2016), "Volkswagen emission crisis - Managing stakeholder relations on the web", In T.A. Majchrzak, P. Traverso, V. Monfort, & K.-H. Krempels (Eds.), *WEBIST 2016: Proceedings of the 12th International Conference on Web Information Systems and Technologies*, Scitepress, Setúbal, pp. 176-187.

Four of the research articles were published in peer-reviewed scientific journals and three were accepted as peer-reviewed articles for conferences. The articles are co-authored and the author of this doctoral thesis, Zhang, is the first author of all seven articles. The following lists the responsibilities of each author.

- Article 1: Zhang designed the study together with Vos. He collected the articles from the databases and analysed them using a data-extraction table to answer the research questions. He compiled the figures and wrote the article with input from Vos.
- Article 2: Zhang designed the study in contact with Vos. He conducted the structured literature review, analysed and reported the data, and compiled the conceptual model together with Vos. Revisions were made by both authors.
- Article 3: Zhang designed the study in contact with Vos and Veijalainen. The Twitter data were provided by Semenov, in cooperation with Veijalainen. The analysis of the empirical data was conducted by Zhang. He also conducted the content analysis of print media and compiled the tables. Zhang wrote the article in contact with Vos, and made the revisions.
- Article 4: Zhang designed the study in contact with Vos and Veijalainen. He conducted a structured literature review and the content analysis of a Facebook discussion platform with an SPSS analysis. He categorized the codes in Atlas.ti in contact with Vos, and wrote and revised the article in contact with Vos and Veijalainen.
- Article 5: Zhang designed the study in contact with Kotkov, Veijalainen and Semenov. The Facebook data were collected by Kotkov, while Twitter data were collected by Veijalainen. The analysis of the empirical data was conducted by Zhang. Zhang also conducted the sentiment analysis with the cooperation of Semonov.
- Article 6: Zhang designed the study together with Vos, Veijalainen, Wang and Kotkov. Vos designed the collection criteria, while Veijalainen performed the Twitter API collection. Zhang analysed the collected data with R-studio and SQL technique. Zhang also conducted the sentiment analysis using R-studio and word cloud.
- Article 7: Zhang designed the study in contact with Veijalainen and Kotkov. Zhang planned the collection criteria. Veijalainen performed the Twitter API collection and Kotkov performed the Facebook API collection. Revisions were made by the three authors.

In the coming chapter, the focus of each study is listed as an overall point of view.

3.1.1 Study I

The structured literature review expounded on what aims are considered important for monitoring activities; what methods are applied in the literature for

monitoring social media interaction from an organisational perspective; what challenges does social media monitoring pose for international companies; and what kinds of trends can be identified in the literature, concerning the monitoring of social media from an organisational point of view. The studies illuminated current insights about social media monitoring, and methods to predict the growth of an issue for organisational communication by international companies.

Organisations listen and interact via social media, to observe the development stage and growth of issues and consider organisational responses. Additionally, the protection of brand image and core values is an important aim. After interventions, organisations review their impact on stakeholders and reflect on future strategies. Methods of monitoring are based on keyword search, and thematic or sentiment analysis, a text mining technique that aims at accessing the polarity of text, including positive, neutral and negative messages (Agarwal & Bhattacharyya, 2005; Taboada, Brook, Tofiloski, Voll & Stede, 2011). Software is used to analyse large data, possibly complimented by manual textual analysis. The study illustrated the growing number of researchers showing interest in social media monitoring over the years.

3.1.2 Study II

Study II focused on clarifying insights from the literature on issues spread in social media. Based on this, a model was proposed to clarify what may affect the dissemination of issues online: i.e., characteristics of the issue, characteristics of the social media, actor resources and general factors. The study clarified the challenges encountered when monitoring social media and helps understand why some issues travel faster than others. Interaction and response strategies can impact the spread of issues. This calls for an understanding of the ever-developing social media services and of the process for the diffusion of issues.

3.1.3 Study III

Study III focused on the awareness of the rapid diffusion of information online; two cases were studied, using Twitter data and online newspapers. The purpose of Article III was, based on empirical data, to add understanding of which factors trigger the fast spread of issues. The cases studied were an issue initiated by the Arctic Sunrise, a Greenpeace vessel, and a shooting incident in Washington, D.C. Twitter posts and online newspapers were collected and frequency graphics were made. The possibility of a time-lag occurring between social media and news media (and vice versa) was scrutinized in detail. The transfer between social media and news media was investigated thoroughly by geo-location and numbers of Twitter users, tweets and newspaper items. The tweets may function as the public stamp of approval in the shooting case and the posting of eye-witness accounts confirms what is happening.

The study analysed the differences between two cases about issue spread in social media, such as which issues are attractive to forward to one's networks, how does the origin of the issue matter, the impact of key influencers, and so on.

3.1.4   Study IV

Study IV was reported in two articles. The main article focused on an evolving crisis that brought about debate on different issues during its life-cycle. The aim of this study was to de-structure the crisis debate into issue patterns to interpret public perception. To begin with, a secondary analysis of empirical studies about crisis communication on the Fukushima 2011 nuclear leak, involving the company TEPCO, was provided, to indicate that a crisis may indeed function as an umbrella for (sub)issues, which may support crisis response. Next, empirical data were collected on the case of the lost Malaysian Airlines aircraft of flight MH370. The study showed that public attention shifted during the crisis, as different issues emerged while various actors co-created the public debate. Thus, decomposing issue patterns can help in developing strategies for multiple issues that evolve during a complex crisis.

Moreover, additional data concerning other airline companies were gained for an additional sub-study, reported in a second article. Three global airlines that each encountered a crisis in the years from 2014-2016 were selected, and four others were added. Their verified Twitter and Facebook accounts were studied, collecting comments, replies, posts and tweets. Situational crisis communication theory was applied to identify crisis response strategies. This showed an adaptation of the crisis response strategy by Malaysia Airlines, since a change in ownership occurred. Sentiment analysis was used in this study to decompose negative, positive and neutral messages (tweets and Facebook comments). The findings of this study showed that organisations experience considerably more negative sentiments after than before a crisis occurs, while active and efficient engagement using the verified organisational accounts can help establish a responsible image for the organisation.

3.1.5   Study V

Study V also included two articles. The first one focused on the complexity of multi-actor interaction online. The aim of this article is to understand the issues and interests of various stakeholder groups and how sentiments developed over time. The Volkswagen emission scandal that began in 2015 was selected as a case study. Various social media platforms were used to collect data, i.e. Twitter, Facebook, forums and blogs. The findings were based on tools derived from Putty, SQL and R-studio. The design of the programming addressed several discussions and data updates. This article underlined the notion of a CSR challenge by Coombs and Holladay (2015), meaning that corporate social responsibility claims may become a risk if promises made by the organisation are not fulfilled.

In addition to the previous research, some additional data were gained from other internet sources and analysed. The second article focused on the role of Volkswagen in the communication about the emissions scandal, scrutinising the information published on its official channels, including Twitter, Facebook

and company websites. It reviewed the reactions of different stakeholder groups and the organisational response strategies.

3.2 Research questions

During the research process, the complexity of the research increased. The following Table 5 lists the research questions for the studies. There are five studies and, for Studies IV and V, an additional article was produced along with the main article. In these cases, we present only the content that adds to the overall purpose of the thesis.

TABLE 5   Overview of the research questions of the studies

The studies and corresponding article titles	Main research questions
I. **Social media monitoring** *Art. 1 Social media monitoring - aims, methods, and challenges for international companies*	RQ1.1: What aims are considered important for the monitoring or tracking activities addressed in the literature? RQ1.2: What methods are mentioned in the literature for monitoring and tracking social media interaction from an organisational perspective? RQ1.3: What challenges does social media monitoring pose for international companies? RQ1.4: What trends can be seen in the literature concerning the monitoring of social media interaction from an organisational perspective?
II. **Issue spread in social media and issues management** *Art. 2 How and why some issues spread fast in social media*	RQ2.1: How are issues diffused in social media, according to the literature? RQ2.2: What factors, according to the literature, influence the spread of an issue in social media?
III. **Spread patterns and issue transfer in crisis situations**	RQ3.1: What differences can be seen in how rapidly the two issues studied spread on Twitter?

Art. 3 Understanding fast diffusion of information in the social media environment	RQ3.2: Is there a similarity or time-lag in the patterns that indicates issue transfer between tweets and newspapers?
IVa. **Issues evolving during a crisis** *Art. 4 Decomposing issue patterns during a crisis to facilitate understanding of public perceptions - The case of the lost airliner*	RQ4.1: What issues are discussed related to and during the crisis? RQ4.2: How do the issues related to a crisis evolve over time throughout the crisis?
IVb. **Online responses** *Art. 5 Online stakeholder interaction of some airlines in the light of situational crisis communication theory*	RQ4.3: Do organisations in crises communicate more/less interactively with the stakeholders? RQ4.4: Do organisations in crises experience more negative sentiment from stakeholders than before?
Va. **Complexity of online interaction** *Art. 6 The issue arena of corporate social responsibility crisis - The Volkswagen case in Twitter*	RQ5.1: How did the debate on the Volkswagen emissions evolve over time? RQ5.2: How can the most active external actors be characterized? RQ5.3: What response strategy can be deduced from the replies by Volkswagen?
Vb. **Multi-actor interaction** *Art. 7 Volkswagen emission crisis - Managing stakeholder relations in the web*	RQ5.4: What are the stakeholders in this crisis and what have their reactions been on social media (Twitter and Facebook) and on some other websites? RQ5.5: What crisis communication strategy did VW group follow in social media, as evidenced by its official Twitter and Facebook profiles and its official WWW pages?

Initially, the emphasis was on describing the different aims and methods used for monitoring issues in the social media. Next, an understanding of diffusion processes became the aim, along with explaining what makes issues travel fast in the web. The following step was to take a close look at spread patterns using frequency graphs over time, and to clarify issue transfer by comparing the graphs of issue spread in social media and news media. A later step was decomposing the frequency graph into various lines for different issues, to clarify the online discourse. Finally, the complexity of online discussion was demonstrated by looking at the online debate as interaction in a multi-actor network.

3.3 Methodology

For the five studies, different methods were used according to the different research requirements. These were primarily quantitative methods, but also included some qualitative and mixed methods. An overview is provided in Table 6.

TABLE 6   Overview of methods used in the studies

Studies	Methods
I. **Social media monitoring** *Social media monitoring - Aims, methods, and challenges for international companies*	Structured literature review using qualitative content analysis
II. **Issue spread in social media and issues management** *How and why some issues spread fast in social media*	Structured literature review using qualitative content analysis Constructing a model
III. **Spread patterns and issue transfer in crisis situations** *Understanding fast diffusion of information in the social media environment*	Quantitative and some qualitative content analysis concerning two cases
IVa. **Issues evolving during a crisis** *Decomposing issue patterns during a crisis to facilitate understanding of public perceptions - The case of the lost airliner*	Qualitative and quantitative content analysis of issues in a crisis
IVb. **Online responses** *Online stakeholder interaction of some airlines in the light of situational crisis communication theory*	Quantitative content analysis of Facebook and Twitter data obtained through their APIs Sentiment analysis

Va. **Complexity of online interaction** *The issue arena of corporate social responsibility crisis - The Volkswagen case in Twitter*	Quantitative content analysis of Twitter data collections, with some qualitative content analysis Sentiment analysis Word cloud
Vb. **Multi-actor interaction** *Volkswagen emission crisis - Managing stakeholder relations on the web*	Quantitative research based on Facebook and Twitter data collection, obtained through their APIs

The methods applied are further explained per study in section 3.4. First, in 3.3, the pros and cons of the chosen approaches are given in the below subsections. There are three aspects to form the detailed approach in each research study: knowledge claims, strategies and method. The basis of each part of the research is built on the knowledge claims, which represent the research questions and theoretical chapters (Creswell, 2013). Strategies were applied to decide on the method to answer the research questions.

Various forms of content analysis were utilized, e.g. to capture the content of online issue debate. Depending on its aims, a study utilized qualitative or quantitative methods, or a mixed-method approach. This is further explained below. Quantitative content analysis was used to gather and analyse tweets, sometimes adding SPSS calculations. Qualitative content analysis was used to conduct structured literature reviews, and to investigate news media reports and posts on a Facebook discussion platform.

3.3.1 Quantitative research

Quantitative research encounters a large data sample in order to generalize common rules to a large population (Creswell, 2013). Creswell (2013), and Grinnell and Unrau (2005) agree that the reliability and validity of the quantitative research are critical. Because of this, SPSS software was applied to compute the correlation for two relevant factors (Field, 2009), to see whether and how the two factors were interrelated. When concerned with large quantities of data, programming techniques outline approaches to the research problem. For example, for the Twitter streaming API, a specific programme (Tweepy Python library from own Python script) was utilized to collect the data by date, as ongoing data could be gathered and broaden current knowledge of communication. The outcomes from the quantitative research follow regulations for sample data, in order to generalize common rules (Creswell, 2013). "What factors influence the spread of issues?" is a typical example of a quantitative research problem.

3.3.2 Qualitative research

Qualitative research is commonly used to analyse specific inductive rich descriptions, with the focus placed on the process to generalize meaning and understanding (Merriam, 2009). The design of content analysis in text research and case study design were both geared towards qualitative methods in this research. Qualitative content analysis was conducted for a structured literature review, as the data extraction table comprised a great number of scientific articles. Relevant concepts and related research questions were analysed in the literature review (Rowley & Slack, 2004). The summarisation was tested by cases, to gain some empirical support. Some hypotheses were set as guidelines for the summarisation, at the beginning of the data extraction table. This method represents a viable approach to conclude current studies and note research directions.

In addition, a case study approach was applied for a secondary analysis of research papers on the Fukushima TEPCO disaster. Merriam (2009) defines a case as an in-description and the testing of a bounded system with defined characteristics. The chief advantages are the application of a single case to clarify the complexity of characteristics towards each element (Yin, 2003). In organisational communication, a specific case study reflects experience from multi-actor approaches. Eye-witness information related to a case supports in-depth understanding of communication, as well. Thus, several real-life cases were selected as typical examples in this dissertation, to help readers to capture the central elements of the research.

Qualitative research was also used to investigate news media reports and posts on a Facebook discussion platform. In the latter case, this was supported by Atlas.ti software. The research design is further explained in section 3.4.

3.3.3 Mixed-methods research

Mixed-methods research contains both qualitative and quantitative methods, and mutual complementarity is its most striking advantage. Qualitative research provides fundamental presuppositions, whereas quantitative research offers accurate and exact results (Roberts, Priest & Traynor, 2006). In some studies, a mixed-methods approach is applied to meet the research requirements. Looking at the thesis as a whole, the research can also be considered to have a mixed methods approach, as although mostly quantitative methods were used to capture large volumes of social media data, where possible qualitative methods were added to gain depth.

In data collection, the different social media platforms require different methods. In the voluminous Twitter data utilized, quantitative textual analysis revealed multiple issues discussed online; in the less voluminous Facebook data, qualitative content analysis gave deeper insight into the contents of posts and comments. Although case studies might use quantitative data, here qualitative methods were applied to examine in greater depth, for example, the MH370

Malaysia Airlines case and the Fukushima TEPCO case. In addition, quantitative data were collected on Twitter to support each case.

In section 5.2 the limitations are discussed of the methodological choices made.

3.4   Research design

For all of the studies the research design, including data collection methods, description of data and analysis methods, will be further explained below.

3.4.1   Study I

In Study I, the focus was on textual content analysis on social media monitoring (see Table 7).

TABLE 7   Research design of study I

I. **Social media monitoring**	
Social media monitoring: aims, methods, and challenges for international companies	
Data collection method	Structured literature review
Description of data	30 articles were structurally analysed, based on a systematic literature review from 2008-2012 of peer-reviewed journals.
Analysis methods	By applying a data-extraction table, the articles were listed by date, from latest articles to older articles. Research questions were set at the start of the table to guide the research direction.

The textual content analysis used an application to international companies; search keywords were used: "social media" and [company or organisation] and [monitoring or prognosis or metrics or tracking or analytics]. The research goal is to elucidate the use of social media monitoring for international companies. Databases are mainly targeted from EBSCOhost and ProQuest. The search covers a period of 10 years (2003-2013), with restriction to peer-reviewed articles, and several try-outs have been applied to better achieve the research aims.

After initial screening of the full English articles, 58 articles were selected on 28th February, 2013 on the EBSCOhost database; an additional 55 articles were selected on ProQuest on 1st March, 2013. After removing duplicates, 93 articles remained. After further checking their abstracts and titles for relevance, there were 38 articles. In the end, the final sample comprised 30 articles, after reading the full text in detail. The references were copied to the software RefWorks, to facilitate the research.

The data extraction table was structured to build a summary of relevant insights found to answer the research questions, with the articles as rows and

different elements of the research questions as columns; the overview covered more than 20 pages for further analysis. This was reported in Article I.

3.4.2 Study II

In Study II, the research aim was to clarify insights in the scholarly literature on issue spread in social media (see Table 8).

TABLE 8   Research design of Study II

II. **Issue spread in social media and issues management** *How and why some issues spread fast in social media*	
Data collection method	Structured literature review
Description of data	In total, 39 articles were marked with asterisk references (31 articles were selected by key words search on database; 8 more articles were added by snow-balling technique). The analysis was built on the selected articles from 2010-2013 from peer-reviewed journals.
Analysis methods	A data-extraction table was used to structurally list the data, and the content of the articles was scrutinized to answer the research questions. The research questions guided the literature review. The factors found in the literature were brought together in a model at a later stage.

The literature review utilised the key words search method, and the chief scientific databases were EBSCOhost and ProQuest. The final keywords were set after multiple try-outs. They included: "social media" and [diffusion or disseminat* or prognos*] and [issue or "information spread*" or message*]. The period spanned 10 years, from 2003-2013 and the results were set from 2010-2013 because of the recent growth in the number of articles.

Only peer-reviewed articles in English were included, and the sum of the search results from both databases was 62 articles. After scanning for relevant articles and a duplicate check, the sample comprised 31 articles. The snow-balling technique brought 8 additional articles. In all, 39 articles were scrutinized using a data extraction table of 15 pages, with the articles as rows and different elements of the research questions as columns, summarising relevant content. The references were copied using RefWorks software. The timeline of the articles was noted to show trends in the research. This was reported in Article 2.

3.4.3 Study III

The focal point of Study III was content analysis of Twitter and online newspapers around two real-life cases (see Table 9).

TABLE 9   Research design of Study III

III. **Spread patterns and issue transfer in crisis situations** *Understanding fast diffusion of information in the social media environment*	
Data collection method	Real-time monitoring of Twitter accounts, using Twitter streaming API
Description of data	Two cases were studied. One relates to the Arctic Sunrise, a Greenpeace vessel, and its crew, who were arrested by the Russian government for piracy on the oil rig. The other case is the U.S. capitol shooting of a woman who rammed security barricades in Washington D.C. and was killed, with an unharmed baby sitting in the back of the car. Both cases cover the same period of 9 days, from 30 September 2013 to 8 October 2013, and attracted much attention in both traditional and social media. Tweets, as well as several English online newspapers, were analysed to reveal potential issue transfer.
Analysis methods	Content analysis of tweets. A keywords filter was used to monitor the ongoing cases to requester in JSON format through persistent connection, by collection in the storage of a repository based on PostgreSQL DBMS (for a detailed architecture of the repository, see Semenov, 2013). Content analysis of online newspaper articles. The articles were catalogued to locate matches with social media in timeline differentials.

At the beginning of the period, key words were set to collect tweet data to study the dissemination using Twitter streaming API, as explained at: https://dev.twitter.com/docs/api/streaming. This allows for the collection of Twitter messages in real time, which contains up to 0.1% of the full Twitter stream. The collection performs by HTTP protocol and returns data. The sample included 51,691 Twitter messages for the first case and 225,893 for the second.

The analysis method used was content analysis, using the tweet data concerning the two cases mentioned above. Frequency graphics were drawn utilizing social media monitoring software and the results were reported in an Excel format. Afterwards, the issue patterns of the two cases were interpreted, based on the result of graphics with timeline differences showing issue dissemination.

The research highlighted the comparison of issue spread in Twitter data and online news media. As to the online news media, the date was set before 14 January 2014, and several well-known American online news media were selected by setting a keyword search. The news items found for both cases were read thoroughly to note style differences, as compared with the social media posts, and similar frequency graphics were made by percentage.

The news media included ABQ Journal, Bangor Daily, Boston Herald, Chicago Tribune, Clarion Ledger, Daily News, Detroit Free Press, Houston

Chronicle, Las Vegas Review Journal, Las Vegas Sun, Los Angeles Times, National Politics, New York Post, NEWSOK, Boston Globe, Denver Post, New York Times, Washington Post, Washington Times, and USA Today. The analysis of the graphics focused on similarities and possible time-lags to illustrate issue transfer between Twitter and online news media. For both cases a graphic was made to compare development of the issue in the news media with the frequencies found in Twitter. This was reported in Article 3.

3.4.4 Study IV

The purpose of Study IVa was to illuminate different issue patterns composed during a crisis for stakeholders to understand public perceptions (see Table 10).

TABLE 10   Research design of Study IVa

IVa. **Issues evolving during a crisis**	
Decomposing issue patterns during a crisis to facilitate understanding of public perceptions	
Data collection methods	Meta search in article databases. Facebook graph API, collecting all comments on the official Malaysia Airlines Facebook chat platform during the crisis.
Description of data	Two cases were studied. The first case concerned the nuclear power plant of TEPCO in Fukushima, which leaked radioactive material starting in March 2011. The second case concerned the Malaysia Airlines flight MH370 from Kuala Lumpur International Airport to Beijing Capital International Airport, carrying 227 passengers including the crew members. The aircraft lost contact with air traffic control on 8 March 2014, which raised heated debate in social media. In the Fukushima TEPCO case, a secondary analysis of peer-reviewed scientific papers was applied, after gathering 15 articles in total. The MH370 case was investigated through a content analysis of Twitter data and discussion on the official Facebook platform of Malaysia Airlines.
Analysis methods	Content analysis to identify emerging issues. In the Fukushima TEPCO case, a data extraction table was used, where each paper was listed by date from latest to oldest, summarizing relevant elements using the research questions to guide the analysis. In the MH370 case, each comment on the official Malaysia Airlines Facebook chat platform was coded into Atlas.ti.

The Fukushima TEPCO case was used to first clarify, through a secondary analysis of peer-reviewed articles, whether a distinct issue pattern occurred throughout the evolving crisis. Next, empirical data would be gained on a current case. To collect the articles on the Fukushima TEPCO case, a meta search in the databases EBSCOhost and ProQuest was conducted. The keywords used were (communication OR "social media") AND (crisis OR disaster) AND (Fukushima OR TEPCO). The search spanned from 2011, the beginning of the nuclear leak, to 2015, when the research was concluded. After checking for duplicates, the total number of articles was 121. Abstracts and titles were read to discard non-relevant articles, for example, many related to individual health or to physics. Finally, 11 articles were selected as relevant, and 4 articles were added by the snow-balling method. Altogether, 15 articles were exported to RefWorks software as references, to facilitate the identification of trends over time.

Concerning the second case, on the MH370 lost aircraft, social media data were extracted to find an issue pattern to explain the public debate. Content analysis on Twitter and on a Facebook chat platform comprised the main body of the research. As to Twitter, the data were gathered by the third-party application topsy.com for social media analytics. After setting "MH370" as the key word, a sum amount of 4,287,228 was found for the topic in the sample period from 5 March, 2014 to 10 April, 2014. The next step was to create a frequency graphic from the collected data, in order to provide a comprehensive view on the crisis debate. Afterwards, specific details in the historical line of the crisis were pinpointed, using background literature on the case to see with which events the peaks coincided.

The official discussion platform of Malaysia Airlines was targeted for thorough scrutiny (www.facebook.com/malaysiaairlines). The sample period was 7 March 2014 to 27 March 2014, and the sample included all comments in English and Chinese, which meant 96.5% of all comments on the Facebook chat platform. The next step was to copy the comments into the research database, checking for anonymisation. The initial screening was done to become acquainted with the contents of the comments, each comment consisting of 1 to 3 sentences. If one user posted several comments, it was counted as one comment. The focal analysis was on posts as individual comments, and not as strings of comments, since these showed little coherence.

There was fierce discussion, with 12 posts published with news, and many more comments. The total number of coded comments was 3120, and after reading samples of comments it was decided to code every comment by date using six family group codes to indicate sub issues addressed in the comments, including: concern for victims, discussion on the causes, safety of flying, reputation, speculation on the location of the aircraft, and other. In a time-consuming process, using Atlas.ti software within each family group, the posts were further analysed by marking keywords.

In addition, SPSS was used to calculate the correlation between the codes of relationship for, for example, 'concern for victims' and 'reputation'. These methods offered insights into the posts and helped summarise the content, re-

44

ducing them to one family each. In conclusion of this research method, the timeline differences between the posts per family code, and thus per issue, were studied by frequency graphics. This was reported in Article 4.

Study IVb was an additional sub-study that outlined that the degree of organisational participation in online crises exerts an impact on the image of the focal organisation (see Table 11).

TABLE 11   Research design of Study IVb

IVb. **Online responses**	
Online stakeholder interaction of some airlines in the light of situational crisis communication theory	
Data collection methods	Software accessing Facebook graph API and Twitter REST API
Description of data	Seven airlines were selected for comparative analysis during 2009-2016, including Malaysia Airlines (MA), United Airlines (UA), Finnair (Fin), Norwegian Airlines (NA), Qatar Airways (QA), Singapore Airlines (SA), and Cathay Pacific Airways (CA). The first 3 airlines above experienced a crisis during the collection period; the latter 4 airlines were global airlines to compare them with. The verified organisational accounts were investigated on both Twitter and Facebook. On Facebook, the comments and replies from the account owners were collected, as were the comments from other users on the official page of the account owner. On Twitter, the account owners' tweets and replied-to tweets were investigated, for example, @Finnair.
Analysis methods	Sentiment analysis was conducted, by recoding messages into positive, neutral and negative scores. The results were presented and further analysed in graphical form.

To better understand the case of Malaysian Airlines, a comparison was made with other airlines with a recent crisis history: United Airlines and Finnair. Four more airlines were added with good financial performance: Norwegian Airlines, Qatar Airways, Singapore Airlines, and Cathay Pacific Airways. These were the Facebook URLs:

- https://www.facebook.com/euro.malaysiaairlines/?brand_redir=349961378450395 (Malaysian Airlines)
- https://www.facebook.com/United/ (United Airlines)
- https://www.facebook.com/finnairsuomi/?brand_redir=291393512910 (Finnair)
- https://www.facebook.com/norwegian.com/?brand_redir=DISABLE (Norwegian Airlines)
- https://www.facebook.com/qatarairways/ (Qatar Airways)
- https://www.facebook.com/singaporeair/ (Singapore Airlines)
- https://www.facebook.com/faucpa/ (Cathay Pacific Airways)

The research period was 01.01.2015-31.12.2015, and all Facebook comments and replies on the Facebook account homepages during this period were collected using the Graph API and arranged in Excel. Additionally, the number of account owners' comments and replies were collected and the data arranged in Excel. The analysis focused on a comparison of the total number of replies by customers and other users, with the total number of replies of the official account owners. The performance evaluation of owner accounts was based on this comparison. Next, the replies of official account owners were, following the data, grouped into four categories: acknowledgements or greetings in various situations; answers to services or booking-related questions; redirecting people to other client services or websites; and apology making.

The Twitter data were collected from April 2016 to June 2016. The target accounts were the seven official airline accounts; the numbers of posts by each airline, comments, replies by the account owner, and replies by others, mostly customers, were noted. Sentiment analysis was used to recode messages into positive, neutral and negative scores, for both the collected Facebook and Twitter data. A graphic was constructed per airline with the scores of the sentiment analysis, to observe differences between airlines. This was reported in Article 5.

3.4.5 Study V

Study Va focuses on the Volkswagen emission scandal from an issue arena perspective, including issues; actors; media; cause of debate; and online interaction in this corporate social responsibility crisis (see Table 12).

TABLE 12   Research design of Study Va

Va. **Complexity of online interaction**	
The issue arena of a corporate social responsibility challenge - the Volkswagen case in Twitter	
Data collection methods	Twitter REST API, using keywords (see below) to set the tweet selection criteria.
Description of data	The case is the Volkswagen emission scandal, which became known on 18 September 2015, when the EPA (United States Environmental Protection Agency) announced that Volkswagen Group had launched lines of diesel vehicles equipped with cheating software to pass the regular emissions tests. In real-time driving, the emissions were up to 40 times higher than the maximum limit in the United States. Volkswagen had been nominated for a CSR award and had labelled the cars as "green diesel". The scandal triggered a heated debate on Twitter and other media.
Analysis methods	Content analysis. A frequency graphic was built based on the collection. Sentiment analysis was also performed, based on the collection, with negative and positive

	scores. The most active accounts were selected by SQL technique, ranking the top 15 in the whole collection period. These accounts were grouped and a stakeholder map was constructed, to explain the differences between negative tweets and positive sentiment tweets. The account "VW" was selected to show the replies from Volkswagen group by word cloud, customizing the use of third party software: https://www.jasondavies.com/wordcloud/. In addition, the 499 replies were grouped into four categories to clarify the content.

Study Va utilises streaming API technique in Twitter by the software of Python. Key words are set using (",",="or, " " = and). For example:

    stream.filter(track=['vw','volkswagen','scandal','reputation',
    'diesel','vwgate','emission','fraud']).

The following has been used since the end of 2015:

    tream.filter(track=['vw','VW','volkswagen','Volkswagen','scandal','reputati
    on', 'dieselgate','vwgate','emission','fraud']).

The collected tweets' language was English, where the tweet text contained such strings that the following predicate yields true (below relevant=1). According to the tweets collection per day, a frequency graphic was designed to show the different issues emerging over time by numbers. Next, sentiment analysis was programmed using the R-studio method. Several online programming bloggers were found, offering views and methods for solution concerning the sentiment analysis of collected tweets, for example: https://www.r-bloggers.com/twitter-sentiment-analysis-with-r.

SQL technique was used in the tweet collection, for example:

    The collection of account "VW" and reply: select count(*) from model3
    where orig_u_screen_name='VW' and reply;
    How many tweets are collected by the account "VW": select count(*) from
    model3 where orig_u_screen_name='VW';
    The most active accounts collection: select count(orig_tweet_id) as
    tweet_num, orig_u_screen_name from model3 where relevant=1 and
    tweet_lang='en' group by orig_u_screen_name order by tweet_num desc
    limit 20;

This was reported in Article 6.

Study Vb was an additional sub-study that discussed the stakeholders' roles on the web in the Volkswagen emission scandal (see Table 13).

TABLE 13   Research design of Study Vb

Vb. **Multi-actor interaction**	
Volkswagen emission crisis – Managing stakeholder relations on the web	
Data collection methods	Facebook graph API was used to gather comments and replies in the official page of Volkswagen (https://www.facebook.com/vw). Data on the official VW websites were also collected. Twitter REST API
Description of data	For the case description, see Va. For this study, various Twitter accounts of the focal organisation were studied, in addition to four VW web pages and the Facebook homepage.
Analysis methods	Content analysis of Tweets and Facebook comments. For the tweets, the key words setting was the same as in study Va. Based on the Facebook data, a graphic was made.

This study collects the major issues in the scandal from the very beginning to December 2015. In Twitter, several active accounts were studied, such as: @Volkswagen; @vwgroup_en; @VW; @VWcanada; @VWnews and so on. A frequency graphic is built based on the number of tweets per day. In addition, a sentiment analysis of the tweets on @VW is conducted, using a controlled sample. The targeted dataset consists of about 25800 tweets, and every 100th tweet in ascending order of time stamp was selected. This resulted in 258 tweets to be checked for positive, negative and neutral sentiment. On Facebook, the collection set graphic was designed according to the comments and replies on the official page of Volkswagen.

Several official VW websites were taken into account in this study:
> www.vw.com
> http://media.vw.com/
> www.vw.ca
> http://en.volkswagen.com/en.html

The content of the websites, insofar as related to the case, was summarized. Based on the various data, a timeline was reconstructed. The reactions of various stakeholder groups were summarized. This was reported in Article 7.

4   FINDINGS OF THE RESEARCH

This chapter offers the overall point of view of each study's findings; the studies are arranged progressively. Each study is addressed with a summarisation of its findings, describing the results of frequency graphics and tables provided in the articles. The detailed explanation of the findings, here, aims to help the reader to clearly understand the research results.

4.1   Study I

Study I focused on the monitoring of social media interactions to shed light on the aim, methods and challenges of monitoring for international companies. The main findings for the research questions are summarized below (see Table 14).

TABLE 14   Findings of Study I

I. **Social media monitoring**	
Social media monitoring - Aims, methods, and challenges for international companies	
Findings in brief: RQ1.1. Aims of monitoring	• Aims vary from listening and interacting via social media, or brand protection and value, to scholarly aims. Progressively, from listening to interacting, influencing, or reflecting.
RQ1.2. Methods	• Multiple methods and tools are used to investigate monitoring, including keyword search, thematic and sentiment analysis, analysis of spread patterns, or a combination of methods.
RQ1.3. Challenges	• Challenges were found related to methodological constraints, high costs and unclear return on investment (ROI), ethical constraints.
RQ1.4. Trends	• A variety of scientific journals began to pay attention to social media monitoring, whereas the total number of articles increased each year.

The aims of monitoring activities, as depicted in the scholarly literature, differ and results may be used to listen, interact, influence and reflect on the social media participation. In the literature, various methods are used for social media monitoring. Many researchers describe their methods, but where ready-made listening tools are used these often are a black box. The high costs of monitoring tools were mentioned, and their accessibility for researchers. Remaining up to date with new emerging methods and tools is considered challenging, as are big data problems. Moreover, the diverse range of ethical constraints cannot be undervalued.

For international companies, observation of online interaction is relevant as it influences brand image and reputation. Viral dissemination of negative content is considered a threat. The monitoring process and interpretation of results is challenging for organisations. This calls for a better understanding of online diffusion processes.

4.2 Study II

Study II elucidates on which issues spread rapidly and what factors may trigger the growth of a specific issue. The main findings for the research questions are summarized below (see Table 15).

TABLE 15   Findings of Study II

II. **Issue spread in social media and issues management** *How and why some issues spread fast in social media*	
Findings in brief: RQ2.1. Diffusion	• Online diffusion has been described as the wide and rapid spread of messages on the internet with different content. Various models describe the diffusion process.
RQ2.2. Factors	• Issue spread is influenced by: issue characteristics; media characteristics; organisational resources and aims; and general factors such as the societal and situational context, and organisational reputation.

Several authors have attempted to model spread patterns, though as yet there is no common conclusion. Therefore, this study reflects on the different approaches to diffusion in social media, such as: cascading; spread pattern analogies; comparing message reach to adoption of innovation; network patterns and roles; and mathematical models.

This study clarified scholarly views on diffusion processes online, discussing also, for example, the role of weak links. Diffusion may be fast or slow; this

calls for explanations of why some topics spread faster than others on the web. For this purpose, a model was proposed, bringing together various factors mentioned in the literature. The approach of diffusion of innovations by Rogers (2010) inspired the researcher to use frequency graphics of social media posts over time, in later studies.

4.3 Study III

Study III focused on a comparison of issue growth patterns in different cases. It also investigated the transfer between news and social media. Twitter data were gathered and analysed for two empirical cases, one about a crew of a Greenpeace vessel captured at a Russian oil rig and another on a shooting in Washington. The main findings for the research questions are summarized below (see Table 16).

TABLE 16   Findings of Study III

III. **Spread patterns and issue transfer in crisis situations**	
Understanding fast diffusion of information in the social media environment	
Findings in brief: RQ3.1. Pattern	• The pattern for the shooting showed a sharp peak and a shorter active period than did the pattern for the Greenpeace case. This shows the individuality of cases, in terms of information dissemination in social media: at the beginning it may attract a lot of attention and this could sharply decrease to disappear or, in some circumstances, grow to a situational peak again.
RQ3.2. Transfer	• The social media and news media were interrelated, and only small time-lags could be observed between them. Social media posts died out later, and contained more user interaction and emotion than did news items.

Frequency graphics were built to clarify issue spread over time. The study demonstrated that the frequency graphs are typical for the situation at hand. The shooting was reported in real time on social media by eye-witnesses, whose messages were often retweeted. The Greenpeace crew was arrested in Russia. At first the issue needed active posting by the organisation to become known, while over time news on legal procedures kept the issue active. This matched the factors brought together in Study I.

Additionally, issue transfer was found to occur from news media to social media (where news media gained information concerning the legal procedures

in Russia) and the other way around (where eye-witnesses were available of the shooting in Washington). The discussion continued longer in social media and contained more emotion.

4.4 Study IV

Study IVa focused on issues that evolve during the life-cycle of a crisis. Two cases were investigated. One was the leakage at a nuclear power plant of TEP-CO in Fukushima, after an earthquake in Japan in 2011; the other was the lost Malaysian Airlines aircraft on flight MH370. The main findings for the research questions are summarized below (see Table 17).

TABLE 17   Findings of Study IVa

IVa. **Issues evolving during a crisis**	
Decomposing issue patterns during a crisis to facilitate understanding of public perceptions – The Case of the lost airliner	
Findings in brief: RQ4.1. Issues	• Five issues were found that together characterize the discourse related to the crisis.
RQ4.2. Over time	• Concern for victims dominates in the beginning, while reputation issues occur at a later phase.

The findings of Article 4 suggest that, in different phases of a crisis, public perception and needs are shifting as time goes by. There are different themes extracted on the two cases. Reputation issues are expected to occur at a later stage in emergency crises, as was proven empirically in the Malaysia Airlines case. Concern for the victims reached a peak at the beginning of the crisis, as well as questioning the causes. At a much later stage, reputation became an issue.

Issues management underlines monitoring as a pre-crisis early warning system. Yet this study clearly showed that, during the lifecycle of a crisis, different issues may dominate at different moments in time. Consequently, recognizing issue patterns may assist in decision-making on communication strategies for multiple emerging issues. Moreover, crisis management insights may be further developed by using insights on diffusion in social media and on issues management.

Study IVb is an addition that investigated how organisations react during the life cycle of a crisis and applied situational crisis communication theory (see Table 18).

TABLE 18   Findings of Study IVb

IVb. **Online responses**	
Online stakeholder interaction of some airlines in the light of situational crisis communication theory	
Findings in brief:	
RQ4.3. Engagement	• In crisis situations, organisations communicate interactively with stakeholders to different degrees.
RQ4.4. Sentiment	• Organisations in crises, as expected, experienced many more negative sentiment messages from stakeholders than before.

The findings of Study IVb also show that the lack of direct replies by Malaysian Airlines may not be unique, but is also not common. The other airline companies investigated showed positive replies in their interaction with other users, often including service messages and apologies. Recommended response strategies (according to SCCT; Coombs, 2007c) were used. The active engagement in conversations online provides opportunities for crisis recovery. Sentiment analysis of messages indicated the atmosphere in the online discourse.

4.5   Study V

Study Va seeks to address the complexity of online debate in the Volkswagen case by analysis from the perspective of Corporate Social Responsibility challenge crisis. The main findings for the research questions are summarized below (see Table 19).

TABLE 19   Findings of Study Va

Va. **Complexity of online interaction**	
The issue arena of a corporate social responsibility challenge - The Volkswagen case in Twitter	
Findings in brief:	
RQ5.1. Timing	• The pattern of this type of issue, a CSR challenge shows a long duration with several peaks that relate to news and court cases.
RQ5.2. Sentiment	• The issue is characterized by high negative as well as positive sentiments. The analysis of most active accounts reveals big differences between groups with different interests, such as between faith and hate holders. Negative sentiments are crisis-specific, whereas positive sentiments seem to link more with the earlier positive technical image of the brand.

RQ5.3. Response	• There were very few replies in @VW. Of the replies made the main types were greetings, redirecting links, apologies, and referrals to services. VW focused on one-way clarification on its websites rather than on being interactive in social media. The response strategy included apology and compensation (be it only to US car owners and dealers), following accusations rather than in a proactive way.

The findings illustrate the importance of stakeholder interests and interdependencies throughout the crisis. New issues emerged in dynamic multi-stakeholder discourse. Several issues got massive attention after the case became public, and the frequency graphic of the numbers of tweets clearly presents this tendency. To gain deeper insight, sentiment analysis revealed negative sharp peaks following news items, while positive sentiment showed a push-back fluctuation after the peaks of negative sentiment. The top 15 most active Twitter accounts clearly showed different sentiment scores, as in the case of faith and hate holders (Luoma-aho, 2015), in this case explained by different interests that would not be revealed in average sentiment results. Sentiment profiles may be more interesting to investigate than the general pictures, which hide heterogeneity.

The replies from @VW are few, but provide apologies and links to websites of the organisation. A great number of independent third party platforms have also been studied, such as blogs, forums and wikis, but these were not included in this paper due to space limitations. Instead, they were added to the second paper of this study.

Study Vb is an addition that discusses the online reactions of different stakeholder groups concerning the Volkswagen emission scandal. Multiple issues emerged in the period of the crisis, and different stakeholders were active (see Table 20).

TABLE 20   Findings of Study Vb

Vb. **Multi-actor interaction**	
Volkswagen emission crisis - Managing stakeholder relations on the web	
Findings in brief: RQ5.4. Stakeholders	• Diverse stakeholder reactions were gathered from VW group, VW retail car dealers in the U.S., the German government, the EPA and the EU, consumer groups with affected vehicles, etc.
RQ5.5. Crisis communication	• Volkswagen group launched several media channels to publish official information concerning the scandal and repair solutions.
RQ5.6. Strategy	• Apology strategies and compensation to U.S. car owners were applied on the various media platforms used in the emission scandal.

Similar cases were used for a comparison of the 2009 Toyota recall crisis and the 2014 Malaysia MH370 missing plane crisis. The kind of crisis and pattern of issue debate for these cases was very different from the VW case, which included software that intended to cheat and which resulted in court cases. In contrast, the Toyota recall was caused by quality control problems (Fan, Geddes & Flory, 2011) and may have been burdened less by legal and financial constraints, whereas the lost aircraft of Malaysian Airlines was an unfortunate event with severe consequences. This coincided with different response strategies.

The findings of the VW case showed few direct replies but rather an emphasis on one-way communication with, for example, a special website launched to serve owners of affected vehicles (https://www.vwdieselinfo.com/). It should also be noted that much debate took place outside VW platforms, in a diversity of forums and blogs.

5   DISCUSSION

The aim of this chapter is to discuss the findings against the background of the insights gained earlier from the theory. The focus of this dissertation is the spread of issues in social media, in many cases related to organisational crises. Literature and many empirical data were used to clarify the process of issue spread.

In this chapter, an issue circular model is presented to represent the insights gained and serve as a basis for the discussion of the results.

5.1   An issue multi-circular model presented

The studies conducted for this dissertation pointed out the importance of recognising spread patterns to understand the process of dissemination. This contributes to the scholarly debate on social media, for which there is increasing interest, as was shown in the literature review conducted. Monitoring social media brings challenges, for example, of a methodological nature. Yet, for organisations, it also brings benefits related to brand image and reputation. By decomposing social media patterns, organizations can see which topics need to be addressed at what moment. Moreover, insights into how people use social media helps communication practitioners understand public behaviour and provide advice to their organisation (Valentini, 2015). This concerns the practical value of the insights gained.

This dissertation underlines the complexities related to issue spread in the online environment, which occurs across multiple media platforms, showing the results of interaction of multiple actors, which is monitored for multiple purposes, and which calls for multiple response strategies (as shown in Figure 3).
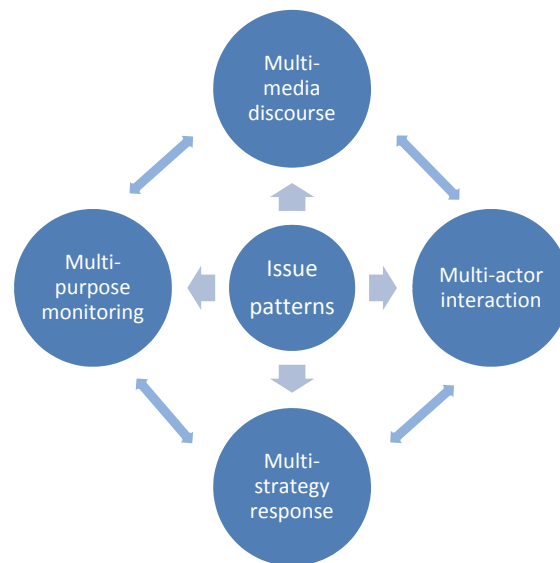
FIGURE 3   An issue multi-circular model

Issue spread occurs simultaneously in *multiple media* platforms with different characteristics, which together form a dynamic picture. To understand issue spread, the changing media landscape must first be understood. This was one of the conclusions of Study II and was reinforced by Study III, which, for example, underlined that the convenience of real-time posting of eye-witness accounts could explain why some news broke fast online. This is in line with the concept of 'issue contagion', as described by Coombs (2002), but proposes fine-tuning based on the changing characteristics of the social media used.

Issue spread is a result of co-creation by multiple actors with different aims, emotions and interests, that interact online. Issue spread can only be understood when acknowledging on the one hand, the ease of access online and, on the other hand, the heterogeneity of the online public, making average results alone of little interest and requiring careful investigation of online data. The latter was a conclusion of study V, where some groups of active accounts showed very different sentiment profiles than others potentially reinforced in the interaction. This is in line with the stakeholder categorization of faith versus hate holders, that assumes big differences in views and related emotions as proposed recently by Luoma-aho (2015), but also points to different kinds of stakes of the holders following the original stakeholder approach of Freeman (1984), as relatively positive reactions came from accounts with interests in the automobile industry while, comparatively, the comments from general and business news accounts had more negative and critical voices.

Organisations monitor issue spread for different reasons. Some want to understand stakeholder developments or see this as a basis for their interaction, while others aim at influencing the debate or evaluating the effect of their interventions. Organisations may have different but also multiple purposes when

monitoring. Depending on the organisation's purposes, the issue spread found when monitoring may appear in a different light. This, in turn, will also affect the response. This was a result of Study I, which highlighted the different aims of monitoring, whereas Studies IV and V showed that monitoring activity doesn't in itself imply that interactive response strategies are chosen. This resonates with notions in issues management that have a clear policymaking perspective; for example, when including the positioning of other actors to locate possibilities for alliances to promote an issue (Crable & Vibbert, 1985), or when identifying more or less active audience types in an attempt to protect the organisation from a threatening issue (Hallahan, 2001).

Organisations use *multiple response strategies* when, for example, different issues emerge during crises that may require different responses. To understand issue spread, one needs to acknowledge the occurrence of issue patterns consisting of (sub)issue lifecycles and consider the effect of response strategies for these. Study IV concluded that decomposing complex issue debate shows sub-issues for which a single response strategy is not enough. This adds to earlier work on reputation restauration strategies, which focuses on strategies from denial to apology and compensation, for example (Benoit & Brinson, 1995; Coombs, 2007a), and shows that crises may include different issues that call for multiple strategies.

This research, by trying to add understanding in this way, actually stresses the complexity of issue patterns. This seems to be a contradiction. However, without acknowledging the complexity and trying to unravel its components, the picture cannot become clearer.

Public attention has moved to interaction in social media, where crises easily spread virally, bringing issues into public focus. The context of the social media environment adds complexity and calls for organisational transparency and attention for monitoring. Rappaport (2010) calls online monitoring tools "listening solutions", which can be sorted into four groups: search engines, text-analytics software, platform vendors and branded communities. This study has explored solutions as online monitoring methods for tracking activities, including: keyword search; thematic and sentiment analysis; spread patterns analysis; and multiple methods.

Monitoring offers a starting point for an organisation to grasp the dynamics of online activities. It enables an organisation to combine listening with various actions, i.e. interacting, influencing, and reflecting on the impact of one's online activities. Interacting strengthens relationships, while influencing is part of a response strategy, and reflecting offers learning opportunities.

This research adds to the understanding of issue spread, by offering a comprehensive approach to explain how messages travel in social media – as a result of interaction by multiple actors, with multiple purposes, using multiple strategies, in multiple interrelated media.

5.2 Limitations

There are several limitations in this research. The challenging area of issue spread in social media offered a relatively new horizon to study, as there is a lack of prior research on social media, particularly in relation to organisational issues and crises. Previous work on issues focused on traditional media. Yet since the development of social media and, for example, the birth of Facebook in 2006, social media research has begun to attract more and more attention.

This research built on a combination of relevant theories that each covered a part of the topic, as reported in Chapter 2 and in the theory introductions of the seven articles. The studies demonstrated the complexity of issue spread, based on various cases using different datasets. A deeper study may have been possible, but in this way the broader perspective of the phenomenon was clarified, showing the relevance of media monitoring, issue transfer, and decomposing issues.

As the scope was broad and the studies were many, the investigations could not go very deep, for example, in relation to reputation management and dialogue strategies. The five studies had to focus on key factors by reducing less-relevant variables. For example, for social media timeline collection the studies mainly focused on Twitter and Facebook, although other social media platforms could also have provided interesting data, such as the images-based Instagram, or the video platform YouTube.

There were also methodological challenges. Reliability analysis deserves due consideration (Neuendorf, 2002). This relates to the quality of the data. In the qualitative research done, working with a data-extraction table in Study I and Study II helped discussing interpretations with other researchers, enhancing the quality of the results. In Study IV, the qualitative work with a large number of Facebook messages was time-consuming. It was also a learning process and the coding was done twice, as the related instructions initially were not sharp enough.

Reliability also gained attention in the quantitative research done. To get trustworthy data, for each of the data sets a tedious cleaning process was undertaken to remove, for example, duplicate and advertisement messages from the data collected. It was also necessary to check that the search yielded relevant results as, for example, searching for the abbreviation "VW" did not only deliver messages on Volkswagen. Particularly in Study V, many different search strings were tested. Running such tests helps acquire dependable results.

As to programming, several third-party online technical R-studio solutions were studied and tested, and software packages (see section 3.4.5) were used for sentiment analysis and word cloud building. As different packages, or even a different order of the packages used, could lead to different results, future research should consider the reliability of the results from various perspectives.

Some of the challenges were common to working with big data. For example, ready-made tools and models were hard to dig into. For many available software packages, open source or commercial, it is somehow not clear enough on how exactly the results are generated. For this reason, the emphasis was on own programming and collaboration with information systems researchers, to gain insights into working with big data. This added to the reliability of the quantitative research.

As to the big data problem, the reliance on software skills and hardware equipment was important in this research. Precision and prudent programming techniques were needed to prevent mistakes in data collection as, for example, just missing a comma may damage data and analysis. Hardware crashes may also lead to problems. In this research, only minor gaps in data collection occurred over time.

An enormous amount of storage was needed for data collection. For example, in the case of Volkswagen, the period covered a whole year with more than 16 million tweets collected. The techniques to solve big data problems were time-consuming and required extra storage space. Two databases were used in the data collection for the Volkswagen case, for example (because of the functions of the Database Management System).

This research seeks to fill research gaps in the body of knowledge by carrying out various studies with different focuses. Study I showed the significance of monitoring social media to organisations; Study II provided various factors to understand issues spread in social media; Study III built frequency graphics to address issue spread over time and transfer between media; Study IV looked at spread patterns to interpret the spread of issues; Study IV researched the growth of issues in crisis; Study V studied the complexities of multi-actor online interaction in an organisational crisis.

5.3   Ethical considerations

Responsible conduct of research focuses on ethical norms and research integrity (Finnish Advisory Board on Research Integrity, 2012). This also underlines accuracy in research. In this research, choices made in research design and implementation were described in detail, in this dissertation but also in articles in which the studies were reported. All seven articles that contribute to this dissertation were peer-reviewed, which enhances conforming to scientific criteria.

Steps were taken to comply with ethical norms. No conflicts of interests were noted. Funding was gained from two projects, of the Academy of Finland and the European Commission. This has been duly reported in this dissertation and in the articles involved. In all matters, researchers must take into account the rights of research participants and the social benefits of research (Association of Internet Researchers, 2012).

In Internet research, it is often not possible to gain informed consent. It is generally accepted that researchers use data on public internet platforms (Na-

tional Committee for Research Ethics in the Social Sciences and the Humanities, 2014). However, researchers should be aware that people do not post messages online with the intend of making them part of an investigation. Internet users may consider some content private even though it is technically made public by them. The researcher was aware of such matters and gained instructions on research ethics, through course participation and discussion with colleagues.

In this research, only Internet data on public platforms were used. Privacy considerations included that anonymity was ensured when using quotes in reporting. For example, in Study IV the comments on the Facebook chat platform were copied into the research database, while checking for anonymisation. However, the volume of data collection in Twitter did not allow for such procedures when storing data sets. Data storage was done temporarily and on password protected university server.

6   CONCLUSIONS

This conclusion section points out the insights gained and the summary of the learning process. The focus of the dissertation was the spread of issues in the online environment, a topic that is vitally important for the survival of organisations today. Nowadays, crises online are complex phenomena, involving various stakeholders that represent different interests and views. Crises can spread virally online and trigger reputation losses, as well as negative financial performance. Therefore, corporate communication requires continuous online monitoring, taking the different characteristics of media into account while decomposing spread patterns.

As described in the introduction section, the aim of this dissertation is to better understand the spread of issues in social media. The scholarly literature underlined the importance of media monitoring, but issue spread was hardly investigated from the perspective of evolving multi-actor debate online. From an organisational perspective, the new social media environment comes with pros and cons for the focal organisation, as it creates unprecedented opportunities for direct communication with stakeholders but also forms a threat when negative messages go viral.

Online crisis communication can have a profound role in maintaining sustainable organisational development, if it builds on a thorough understanding of issue spread. Therefore, the research focused on how to interpret monitoring results online, such as decomposing the patterns from frequency graphics, to be able to utilise the available data for crisis communication strategy making by organisations. As Macnamara (2016, p. 314) states: "There is a marked and concerning lack of listening by organisations". The insights gained in this dissertation can contribute to organisational listening, but also a culture of listening is needed, to ensure that monitoring results will be utilized for a better understanding of stakeholder views and strengthening of stakeholder relations.

The learning process for this dissertation was enhanced by building collaboration between the Department of Communication and the Department of Computer Science and Information Systems. The researcher gained experience in the context of a crisis communication project, as well as in an IT project. As a

result, insights into crisis communication were connected to insights into investigating big data in social media. By working with a large volume of data in different cases, a deeper insight into the fast-evolving online debate was gained. The contribution of this dissertation to the literature, from both a scientific and practical perspective, is presented in the form of propositions, below.

6.1 Insights gained that help scholarly understanding of issue spread

Proposition 1: Different frequency patterns occur for different kinds of crisis, so the pattern found characterizes the crisis event.

The spread patterns found in Study III provided guidance to analyse the spread of issues. As to crisis situations, this research illustrates that different characteristics of crises, or various crisis types, show up as very different spread patterns in the frequency graphics made for two different cases: the issue initiated by the Arctic Sunrise and the U.S. Capitol shooting.

Firstly, the period of time differs between the above two crises. The Arctic Sunrise case is stretched over a longer period of time, as a sequence of events in an international context, whereas the shooting case is a one-day emergency soon clarified not to be a terrorist attack but an individual sad case. The frequency graphic on the Arctic Sunrise case shows many small peaks over a long period, for example, coinciding with emerging news on the case because of legal procedures and Greenpeace activities in various locations, versus one high peak over a short period (as may be typical for an emergency that does not evoke much after-play). This relates to the actors involved. Greenpeace used social media to spread the issue via its channels to an international audience and to keep the issue alive; whereas in the shooting case, the police used social media to give clarification on the case and explain that it was a local incident that did not constitute a continuing threat.

Secondly, the significance of geo-location directly affected the pace of the spread of an issue, because the Arctic Sunrise case happened in isolated Russian waters, whereas the shooting case happened in Washington, D.C. with eye-witnesses quickly tweeting messages to tell what they had seen. The shooting case, therefore, showed a quick high peak.

To confirm that issue spread patterns are specific to the type of crisis, in study V, the VW case, which constituted a CSR challenge, was investigated. The frequency graphic showed high peaks, explained by the initially high responsibility expectations VW had created that, however, were followed by illegal behaviour. The pattern was characterised by a long period of peaks caused by news reports, as additional information was revealed and the continued progress of court cases was reported. Such results encourage the use of big data to

clarify emerging patterns, so that patterns gained in research work may help 'read' the crisis situation.

Proposition 2: Issue transfer between news and social media happens both ways, and the kind of crisis explains which way it happens and how fast.

Issue transfer between news and social media has been clarified in study III, where frequency graphics in social media were compared with news reports. In the case of the Arctic Sunrise, there was an obvious time-lag between news and social media. The news reports showed an earlier peak, indicating that journalists had sources for this far-away event, whereas 2 days later Twitter peaked with a longer, continuing discussion.

In comparison, news reports and tweets were strongly intertwined in the case of the Capitol shooting, as there was no visible time-lag between news and social media. Moreover, news and social media were both referring to each other. In social media the discussion continued longer, as people were wondering about a child involved.

Here it is concluded that issue transfer is generally to be expected. Public interest in an emerging issue could be discovered by journalists. At the same time, news items are strongly discussed in social media nowadays, for example, on the Facebook homepages of the focal organisation or on Twitter, where the information diffusion function has been commonly used in users' daily lives, and where tweets having to do with needs and emotions are often retweeted.

On the whole, the spread patterns in news media and social media are rather similar, as items in both media formats are interrelated. A time-lag may appear when news media have better access to sources and publish items first, however, with news media active in social media and people closely following and sharing news online, this quickly also raises attention in social media. Alternatively, in the case of eye-witnesses, social media are expected to be first, however, online news media quickly adopt emerging issues, resulting in no visible time-lag. A difference may be the longer duration of social media discussion as, for example, Twitter generates many emotional tweets that tend to be retweeted more often and raise a longer heated debate online.

Proposition 3: Crises can be seen as an umbrella for issues with life cycles within the lifecycle of the crisis, whereas discovering issue patterns by decomposing issues debate helps issues management, not only before but also during crises.

In the life cycle of a crisis, multiple issues occur and die out in different stages. Study IV shed light on the way crisis debate is formed by several issues occurring in different stages. In the case of Malaysia Airlines aircraft lost on flight MH370, at the beginning of the crisis public attention focused on concern for the victims. Later, attention shifted to complaints about the organisation's lack

of action and information, affecting organisational reputation. This had been suggested in the literature, but now the empirical work has also been done to clearly show it.

Issue spread in a crisis situation often cannot be clarified by looking for a single-issue lifecycle pattern. Different issues emerge over time. For example, in the case of the Volkswagen emission scandal, according to Study V, in the beginning stages public attention was partly on the EPA and U.S. emission norms, whereas later people began to discuss business ethics more deeply and to question responsibilities. When a discussion reaches its peak in online data collection, the volume of data is large and looking for patterns gives directions for the research.

Overall, the research showed that during a crisis patterns can be recognized by decomposing issues as they evolve in various stages of a crisis. This enhances comprehension of public perception in crisis situations and enables detailed communication strategy-making. It also encourages further exploration of correlations between types of issues and crisis phases.

Proposition 4: Distinguishing different groups of voices within an issue debate can clarify the tone of the discourse, revealing different sentiment profiles for groups of actors.

Actors in the online debate cannot be approached as a mass media audience. Average sentiment results may hide important differences between, for example, faith and hate holders, obscuring the understanding of multi-actor debate. It is complicated to locate different voices in social media. In study V, different sentiment profiles were shown among the most active accounts in Twitter. News-related accounts were obviously more critical than automotive sector accounts. Knowing only the average sentiments, in such a case, is not very helpful. This result fits the issue arena approach of competition among multiple actors.

This research illustrated ways to locate the most active actors online and to analyse their distribution over different stakeholder groups. Making different sentiment profiles adds depth to sentiment analysis and helps note different voices. In corporate communication research, response options could be linked to groups with different sentiment profiles. Seemingly abrupt turning points of average sentiment over time may relate to some sentiment profiles getting a larger share. Just as, based on Study IV, it was recommended to decompose debate into different (sub)issues, Study V pointed to breaking down big data into actor groups with different sentiment profiles, using sentiment analysis of the collected messages to address what kinds of voices are being heard. At the same time, the understandings of sentiments also help scientific understanding of the diversity observed in online discussions.

Proposition 5: Strategies by focal organisations hardly include directly connected posts, such as replies, comments and retweets, but may comprise indirect reactions where matters discussed by other actors are addressed without a visible connection.

Research can categorise messages to reveal response strategies of focal organisations. This was done in Study V and revealed very few interactive strategies used in the Volkswagen case. The replies in @VW were categorised into four groups, among which were apologies and links to official VW websites. Additionally, "Sorry" was one of the words standing out in the computed word cloud. However, there were very few replies to Tweets or Facebook posts on VW homepages, and mostly one-way informing was provided via VW websites. Active interaction could have shown that stakeholder views were taken seriously.

Interactive strategies are considered as directly relating to stakeholder views. In the online environment, this would include direct replies, comments or retweets. Indirectly, matters addressed by other actors may have been included in messages by the focal organisation. To what extent this was the case, and if this was at all perceived by stakeholders as interactive, could not be measured in this research.

6.2   Insights gained for practice usage

Proposition 1: Issue spread may be expected, depending on the case, when understanding which features make issues travel fast.

Communication experts may wish to indicate whether an issue is expected to develop fast. This research focused on a better understanding of issue spread as a phenomenon and did not venture into predicting issue spread. However, in the literature review in Study I, several models were addressed that aim at capturing issue spread. This suggested to look for clock-formed issue lifecycles in the frequency graphics constructed in the empirical Studies III-V.

Study I brought together insights from previous studies that describe the diffusion of information as cascading; viral spreading; diffusion patterns similar to the adoption of innovations; network patterns and weak ties; and mathematical models. In conclusion, in Study III a model was presented that mentioned various factors to be taken into account: characteristics of issues, media, actor resources, and general factors. This model provides practitioners with a basis to indicate which issues may travel fast.

Proposition 2: When monitoring, one can focus on distinguishing new evolving issues during a crisis.

The relevance of monitoring online debate was underlined in Study II. Monitoring issue growth is used for different purposes. Organisations can try to grasp public opinions, via monitoring results, upon which to base their prioritizations and other strategy decisions. As the amount of data available may confuse users, a clear vision on aims and focus is needed. Various issues may mingle in the debate, complicating strategy making. In crisis communication, the focus is on distinguishing new issues that may need attention.

In Study IV, the debate was unravelled by decomposing it into individual issues, as they occurred over time during the longer period of crisis. It illustrated the shifting of public attention from understanding the event and its initial consequences to evolving situations and, for example, later reputation matters. Practitioners can focus on recognizing issue patterns that explain public concerns. This helps finding sub-issues which mostly need attention at a particular moment, and addressing topics essential for publics which builds trust. It also helps organisations increase interactivity online, building relations. Thus, the studies underlined the importance of monitoring to prioritise communication efforts.

The extraction of individual issues is essential, because a crisis may be a long, complex process. Looking for new evolving issues during a crisis helps build response strategies for the steps in the recovery process.

Proposition 3: Sentiment analysis adds understanding, however, sentiments differ between groups, making the average scores of sentiments less informative than comparisons between groups.

Along with emerging issues indicated by frequencies, sentiment analysis and especially identifying different sentiment profiles, also offers insights into public perceptions for practice. In Study IVb and Study V, sentiment analysis was conducted.

In Study IVa, the comparison of similar organisations was fruitful, while in Study V splitting up averages in sentiment profiles added depth. This was shown by analysing Facebook comments of several airlines in study IVb and by analysing tweets and mapping sentiment profiles in Study V.

In Study V, the ranking of most active accounts indicated who talked most in Twitter, and sentiment profiles were made by grouping these accounts. The sentiment scores varied much for the groups, as there can be hate as well as faith holders of the focal organisation. Therefore, average sentiment results are informative to some extent, whereas comparisons add depth. If one would only work with average sentiment results, interesting insights about diversity of actors in multi-actor debate may remain hidden. By clarifying different sentiment profiles, response strategies can better take the perspectives of different groups into account.

Proposition 4: Visualization techniques for creating vivid graphics and images benefit interpretation of monitoring results.

By collecting and filtering relevant messages, frequency graphics were built. This gave a clear picture of the spread of issues, the amounts of shared messages over time, high and low peaks. In all of the empirical studies frequency graphics were used to show the development of issues over time. Especially showing (sub) issues discussed in a graphical way may benefit prioritization of problems to be solved and strategy making in practice. Issues were extracted in a qualitative way, in Study IV, by a content analysis of Facebook comments, coding them by using Atlas.ti software. In study V groups of messages were constructed quantitatively to analyse response strategies. In practice, ready-made software may be used by focal organisations of which the method and reliability is a black box. Here it is underlined that visualization should enable understanding of the growth of (sub) issues over time.

Similarly, as shown in Study V, visualization of sentiment analysis results can clarify another part of how issues emerge over time, and comparisons or splitting up sentiment profiles can be enlightening.

In Study V, also word cloud was used to illustrate the tone of voice by making words used often visible. This could be useful for small datasets, as in Study V it was used for a limited number of reply tweets by the focal organisation, whereas for larger datasets the word cloud results seemed too diverse and thus less informative. Visualization of results is important to be able to quickly grasp trends and prioritize problems to be addressed in communication strategy making.

6.3   Future studies

This research pointed to the complexity of issue spread, the relevance of monitoring, issue transfer and decomposing issues. This provided a broad understanding of issue spread. Future studies could more deeply focus on multi-actor interference in issue debate and observe the effect of response strategies.

The multi-actor perspective proposed in issue arena theory could get more attention, looking at how the input of individual actors influenced others and, therefore, the course of the debate. This would call for qualitative research that, for example, might be conducted in the smaller environment of a forum.

Future research could replicate the studies done in more crisis cases, to further clarify the occurrence of different issue spread patterns in different types of crises. It would also be interesting to connect the type of crisis to the type of response (adding to Verhoeven, Tench, Zerfass, Moreno & Verčič, 2014), possibly in different countries (as in Luoma-Aho, Moreno & Verhoeven, 2017).

Furthermore, another line of investigation for future studies could be a deeper investigation of sentiment profiles, by a quantitative approach, identify-

ing and grouping internet users with different sentiment scores to understand what characterises faith and hate holders in the debate.

6.4 A changing picture

By summarizing insights gained in the form of propositions for science as well as practice, the contribution of this dissertation is made concrete. The research added understanding of issue debate in social media and illustrated the importance of monitoring, especially in emerging crises. At the same time, it also showed that there is still much to do.

A major challenge in this area of research is the dynamic nature of the social media themselves, for example, the structure of social network sites is changing with the development of technology. For example, Facebook used to be considered a strong-ties based network in 2010s, while recently several other functions became available that also allow building weak ties in Facebook, e.g. live video broadcasting through which organisations begin to establish their own open channels to publish products news and provide services. Multi-function services regarding social media platforms have begun to emerge in different ways. Therefore, social media services require continuous monitoring using up-to-date technology.

Another challenge lies in big data problems, as the designing of programmes is becoming more and more complex with massive heterogeneous data sets such as the analysis of videos and images. Compound sentences represent multiple meanings, and thus the interpreting process needs to be designed with care.

Social media formed a disruptive innovation that changed communication practices. These changes will continue to occur in the future, as different formats of online communication will emerge that call for understanding in research, and new monitoring and response strategies by organisations. Web sites may develop to embed social media content in different forms, less text and stronger visualisations. For example, video messages and live video are becoming increasingly popular, providing content that may be challenging to monitor and analyse. The multidimensional contents may enable future publics to have different ways of interaction, making media decentralization an undeniable trend. Moreover, the emergence of artificial intelligence, providing intelligent agents as online hosts that people can talk to, may create different forms of interaction that will also affect the spread of issues and the communication between organisations and publics in the future online environment.

It is clear that investigating the spread of issues will continue to require collaboration between various experts. Future studies could, as attempted in this research, benefit from a combination of expertise in information systems and communication sciences.

YHTEENVETO (SUMMARY IN FINNISH)

Organisaatiot ovat sosiaalisessa mediassa uusien haasteiden edessä

Organisaatioiden toimintaympäristö on nykyään hyvin dynaaminen. Organisaatioiden on seurattava reaaliaikaisesti internetkeskustelua asioissa, jotka ovat keskeisiä niiden toiminnalle. Ymmärrys internetkeskusteluiden kulusta ja siitä, miten keskustelut syntyvät, kehittyvät ja muuttuvat, tarjoaa organisaatioille mahdollisuuksia rakentaa pysyviä suhteita eri sidosryhmien kanssa sekä mahdollisuuksia ymmärtää, miten asiat leviävät sosiaalisessa mediassa ja mitä tämä tarkoittaa organisaatioiden vuorovaikutukselle.

Tässä tutkimuksessa selvitetään, miten informaatio leviää sosiaalisessa mediassa ja mitä organisaatiot voivat oppia tästä ongelmien ja kriisien hallinnassa. Tutkimustulokset eivät kuitenkaan hyödytä vain organisaatioita ja niiden sidosryhmiä vaan tuloksilla on myös yhteiskunnallista arvoa. Lisäksi tutkimus osallistuu akateemisten näkemysten muodostamiseen nopeasti leviävistä ja yhdessä rakennetuista yhteiskunnallisista ongelmista.

Tutkimus keskittyy ongelmiin ja kriiseihin, jotka koskevat kansainvälisiä organisaatioita sekä niiden sidosryhmiä ja joista on keskusteltu julkisilla keskustelufoorumeilla, erityisesti Twitterissä ja Facebookissa. Sosiaalisen median käyttäjät tarvitsevat ymmärrystä, jotta he voisivat huomioida ja tulkita, miten internetissä tapahtuva vuorovaikutus asettaa moninaisten tahojen ongelmat areenoille. Tähän tutkimus tarjoaa eksploratiivisen lähestymistavan. Fokuksena on diskurssin sisällön kehitys ajassa.

Tutkimus korostaa, että
- Valvontaa tarvitaan eri perspektiiveistä (tutkimus 1)
- Ongelmat, joita tutkit, leviävät monia reittejä (tutkimus 2)
- Ongelmat ovat hyvin erilaisia, ja riippuu niiden luonteesta, miten nopeasti ne leviävät ja vaikuttavat muihin asioihin (tutkimus 3)
- Kriisi voi sisältää moninaisia ongelmia (tutkimus 4)
- Ongelmia käsittelevä ja monista toimijoista koostuva vuorovaikutus on monimutkaista (tutkimus 5).

Asioiden leviämistä sosiaalisessa mediassa voidaan ymmärtää vain, kun tunnistetaan ilmiön monimutkaisuus. Sen vuoksi tämä tutkimus tarjoaa kokonaisvaltaisen lähestymistavan selittää, miten asiat ja keskustelut kehittyvät sosiaalisessa mediassa, kun vuorovaikutuksessa ovat useat eri toimijat erilaisine päämäärineen ja käyttäen erilaisia strategioita useissa toisiinsa liittyvissä medioissa.

Asiasanat: sosiaalinen media, teemojen hallinta, Facebook, Twitter, teema-areenat.

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72

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ORIGINAL PAPERS

Study I, Paper 1

SOCIAL MEDIA MONITORING – AIMS, METHODS, AND CHALLENGES FOR INTERNATIONAL COMPANIES

By

Study II, Paper 2

HOW AND WHY SOME ISSUES SPREAD FAST IN SOCIAL MEDIA

By

Boyang Zhang & Marita Vos, 2015

How and Why Some IssuesSpread Fast in Social Media

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Abstract

This paper brings together current insights from various disciplines into the spreading of social media posts.By astructured literature review of peer-reviewed literature 39 recent articles on diffusion in social media were located. The search spanned 10 years, although all the papers found were published after 2009, indicating that the examination and observation of spread patterns in social media is still in an early stage.

The analysisfocused on spread patterns and factors that may explain how rapidly issues spread in the online environment. Based on the findings, from an organizational perspective a model is constructed and directions for future research are suggested.The model focuses on characteristics of the issue, of the social media involved, actor resources and general factors. A better understanding of how social media posts spread helps organizations to be prepared for upcoming issues and crises, such as launching early rumour detection to prevent losses in organizational and brand image.

Keywords: Diffusion, spreadpatterns, social media, monitoring

http://www.ojcmt.net/
http://www.ojcmt.net/articles/51/516.pdf

Introduction

The aim of this paper is to clarify the diffusion patterns and factors that explain the spread of issues in social media. This can help organizations to interpret the results of social media monitoring and decide on the necessity for social media interventions. To this end, the paper adopts a broader perspective, collecting insights from various disciplines on diffusion in social media.

Social media allow people to build social networks using internet applications that provide users with a variety of exchange platforms (Nadeem, 2012; Wang, 2012). This has led to an explosive growth of social media posts. For organizations, the rapid development of social media brings not only insights into customer opinions and new ways to spread their own viewpoint(Kumar & Mirchandani, 2012), but also rapid diffusion of possibly unexpected topics, such as negative electronic word-of-mouth messages (Zhang, Jansen, & Chowdhury, 2011). Nowadays, the universal use of social media has become apriority in order to improve organizational performance and enhance communications with users (Fan, Geddes, & Flory, 2013). Social media may strengthen organizations' ability to reach a large audience. However, alongside opportunities,social media interaction also brings challenges, e.g. "the advent of consumer-generated content and its rapid diffusion takes much of the control over messages away" (Farshid, Plangger, & Nel, 2011, p. 228).

Issues are topics discussed publicly (Coombs, 2002), in issue arenas that can be traditional news media and new online media (Luoma-aho &Vos, 2010). They can pose problems or opportunities for an organization, as the topics discussed may be linked to an organization and affect the interaction with public groups. Issues are not owned or defined by organizations. As Heath (1998, p. 275) puts it, "In this era of cyberspace, the Internet and Web have come to be a powerful arena for such discussions which do not allow media reporters, editors, and news directors or governmental officials to be the final power in determining whether issues discussants can have their voices heard".

Although organizations realize that they are not in control of the spread of issues in social media, for issues management purposes they need to be aware of what might be coming. Monitoring discourse on topics related to a certain organization may reveal a number of topics, but which of these are likely to grow fast? Predicting the growth of issues requires a better understanding of the ways in which issues spread in social media, for example insight into spread patterns, and factors that may explain rapid issue growth. What makes ideas or issues stick, a phenomenon known as 'stickiness', can be modelled as the probability that a post is passed on to others (Romero, Meeder, & Kleinberg, 2011). Hence, as stated by Rogers, Chapman, and Giotsas (2012, p. 120) "it is crucial to understand the type of content that is likely to be shared".

The theoretical basis for this paper is based on a structured literature review. Below, the method used to selectthe literature for review is described, and the insights are reported. Finally, a model is constructed, and conclusions are given.

Structured Literature Review

Following a literature search, key sources in refereed journals were identified and analysed to find recent insights on the ways in which issues spread in social media and the factors that may enable or hinder fast issue growth. The method of a systematic literature review was chosen to provide a consistent knowledge base, adopting explicit procedures and including documentation of the selection criteria (Sümer, 2011). After trying out different keywords, the words "social media" and [diffusion or disseminat* or prognos*] and [issue or "information spread*" OR message*] were chosen. The searchincluded the databases EBSCO and ProQuest andspanned 10 years. Initially, 62 papers were identified, and after scanning for relevance based on the keywords, thisyielded 31 articles from 2010-2013. Snow-balling added 8 more articles. A total of 39 articles (marked with an asterisk in the list of references) were further analysed.

The content of the articles was scrutinized in a thematic analysis using a dataextraction table.

The analysis focused on the following research questions:

(1) How are issues diffused in social media, according to the literature?

(2) What factors, according to the literature, influence the spread of an issue in social media?

The findings show increasing research attention to the spread of social media posts. Of the refereed articles found, 6 were published in 2010, 7 in 2011, 17 in 2012 and 9 articles up to mid-2013, when the search ended. The journals showed a wide range, four journals yielding 2 articles (Behavioural scientist, Physical Review, Vaccine and PLoS ONE) and several journals one article. In this way insights from various disciplines were gained. Below, we report the findings on viewpoints concerning diffusion in social media, how issues spread in social media and,what are the enablers and barriers to this, according to the literature.

Viewpoints on Diffusion in Social Media

The point of departure of this study was to clarify insights in the literature on the spread of social media posts. Each article found revealed a different and often unique angle on the topic, making it difficult to form a clear picture of the state of play. Therefore, we first reflect more deeply on the different objectives of the investigated publications in investigating the spread of social media posts.

In the investigated literature – drawn from a variety of disciplines –the reasons for studying diffusion in social media, show considerable diversity. Many authors were keen to find out how messages can be spread *rapidly and widely* on the web:some had advertising goals in mind (Li,& Shiu, 2012; Williams, Crittenden, Keo,& McCarty, 2012; Zhang et al., 2011), while others sought to engage people in an educational health campaign (Bosley, Zhao, Hill, Shofer, Asch, Becker,& Merchant, 2013; Desai et al., 2012) or a political campaign (Bronstein, 2013).

However, some researchers were interested in finding ways of *reducing* the diffusion in social media, in order to counteract incorrect messages. This concerned false rumours about

organizations, or messages that could be detrimental to the health of the receivers (Lau, Gabarron, Fernandez-Luque,& Armayones, 2012), for example vaccine-critical blogs (Keelan, Pavri, Balakrishnan,& Wilson, 2010) or videos on YouTube (Robichaud et al., 2012).

Other authors were not interested in spreading a message widely, but rather at a more *precisely targeting* of message content (e.g. Cain, Romanelli, & Fox, 2010). Finally, for some authors, the focus was not on social media interventions but on collecting evidence about the *evolving needs* of public groups so as to reveal problems at an early stage and thereby support risk communication and management (Hiltz, Diaz,& Mark, 2011).

In all of the above cases, a better understanding of the factors that influence the spread of issues in social media may,depending on the purposes of the organizations and their communication policy, facilitate decision-making on tailored communication strategies. The importance of monitoring the social media environment has been underlined (Ruggiero &Vos, 2014).

Monitoringprovides a picture of the situation at a certain moment, but does not per se reveal which of the issues found will spread fast. To do this would involve *repeated measurement* to extrapolate trends. However, while this may enhance quantitative understanding of the spread of issues, a fuller understanding would also need a *qualitative approach* to reveal the factors behind the (expected) success of some issues, and the (expected) failure of others, in achieving rapid and wide dissemination. Therefore, ongoing monitoring activities and a better understanding of issuespread in social media and the factors that may enable or hinder dissemination, are important for organizational decision-making.

How Social Media Posts Spread

In the social media environment, the organization does not need to seek out all the relevant stakeholders, as social media users are linked in various ways and messages may find their way via searches as well as, for example, followers or friends (Bronstein, 2013; González-Bailón, Borge-Holthoefer, & Moreno, 2013). Moreover, users often produce and

initiate the spread of issues themselves. In the following sections, we summarize how issues spread in social media, as described in the literature.

Cascading

In the literature, spread patterns are seen as directed by the paths along which messages travel in social media. Various authors (e.g. González-Bailón, Borge-Holthoefer, & Moreno, 2013) have conceptualized this as cascading, a process by which a particular message is passed to a first group of receivers who then *pass it on* to the next, and so on, until an extensive network is built up. Generally, by standing out in social media, cascading allows users to contribute to a virtually unlimited process of diffusion. In micro blogs such as Twitter, people have followers, and therefore any message emitted from a node will immediately be available to anyone following the tweet sender (Borge-Holthoefer, Rivero, & Moreno, 2012). By a simple retweet, messages spread, embarking on numerous different paths (Bosley et al., 2013; Stefanidis, Crooks,&Radzikowski, 2013; Stieglitz,& Dang-Xuan, 2013; Zhang et al., 2011).

The concept of cascading suggests that posts that are passed on may multiply. However, not all posts will be shared by cascading. Empirical research on Facebook did not show evidence of cascading as such, but rather the colliding of shorter chains while a *threshold* amount of start-nodes were needed in order to spread apost wider (Rogers et al., 2012).

Spread Pattern Analogies

According to Banerjee and Agarwal (2012), the spread pattern in social media can be compared to a stream of ants using *swarm intelligence*, meaning that the ants do not move in a random way but follow the intelligence of the swarm, making their behaviour easier to predict. Similarly, by observing the interactions within a certain phase one can predict the future behaviour of a large number of users in the online environment.

More often,with its characteristics of self-replication and fast diffusion, the spread pattern in social media is compared to a *virus*, and the speed of spreading addressed as the 'infection

time' of individuals (Doerr, Blenn & Mieghem, 2013). For example, Coombs (2002) uses the concept of 'issue contagion' to address the spread of issues. In epidemiology, the spreading of viruses is, for example, related to contact probability and frequency, based on a model developed by Reed and Frost in the 1920s. In recent years, this model has inspired the development of mathematical models for the spread of messages in social media (see a later section).

Like the spread of viruses, the diffusion of social media messages may start in a particular location and then spread to others. To analyse the diffusion of messages, starting for example in a local event, *geo-location* can be used, as was done in the case of political communication on Twitter (Stieglitz,& Dang-Xuan, 2013). However, currently only a small proportion of social media messages is geo-located.

Comparing Message Reach to Adoption of Innovations

In the literature, the number of people reached by a social media message is often explained by reference to the model of *diffusion of innovations* as developed by Rogers (1995), who defined diffusion as a process by which an innovation is communicated through certain channels over time amongst the members of a given social system. His model shows a normal (bell) curve with successive groups of people adopting the innovation. The model was also applied by communication scholars, for example, to investigate the diffusion of news among the public (Valente,& Rogers, 1995). To apply this model to hypes in social media, the consultancy firm Gartner extended the curve after the peak of inflated expectations to show a steady plateau of productivity (Fernando, 2010).

The literature shows that spread patterns do not always follow the normal curve, as the structure of networks and their paths for diffusion differ, as also do the positions of those who trigger the diffusion and help disseminate the message (González-Bailón et al., 2013). Time intervals also need to be considered as, particularly in the initial stage, there may be a *time lag* in the passing of a message (Fan, Geddes, & Flory, 2013). Similarly, long power outages

may also result in unexpected time lags. More importantly, a study on the reputation of the brand Toyota showed that the content of a social media post*changes* as it is passed on, and may become more positive, neutral or negative (Fan et al., 2013). This adaptation in the process of passing on social media posts was also noted in the activism engendered during the so called Arab spring, when resistance leaders reconstructed messages to suit their needs, after which the local message was recreated for a global audience (Newsom & Lengel, 2012). This shows that the spread of social media posts, rather than passing on a package, can be seen as an interaction between various actors.

Network Patterns and Roles

The way issues spread depends on the *roles* of the actors in the network. According to Castells (2008, p. 152), a network can basically be seen as "a set of interconnected nodes".Some individuals are more connected than others, so connectivity is not equally distributed across the network. In the network of micro blog followers, only a few highly connected nodes act as hubs (Borge-Holthoefer et al., 2012). A hub has a dominant position in a network, as it functions as a gatekeeper (Gruzd, Wellman, & Takhteyev, 2011), deciding whether to pass on or not pass on social media posts to other users.

It has been suggested that, in particular, *weak links* are important for diffusion in the online environment (Granovetter, 1973). However, in social media the role of weak links needs to be specified. Empirical research in the social media environment showed that weak links do not speed up diffusion, but "act as bridges to connect isolated communities" (Zhao, Wu,& Xu, 2010, p. 2). Diffusion may stagger to a halt if connections are bounded; in such instances, wider links with other networks are important for the growth of an issue.

Mathematical Models

To predict the spread of social media posts, various authors (e.g. Laskela, 2010) have developed mathematical models to describe the relationships between the variables that influence diffusion. Such quantitative models often focus on the speed and number of nodes

reached or patterns occurring, rather than what kinds of issues are shared and what kinds of people are reached. According to Zhao et al. (2010), such models, based on relational data, provide an estimation of *random* diffusion, although it has proved difficult to include all the complexities of real world exchange on the Internet.

According to Kumar and Mirchandani (2012) only few attempts have been made to define message spread, influence and impact in relation to marketing or communication management. They tried to predict the ability of influencers to generate viral spread, based on e.g. the number of times a message was forwarded and the number of comments or replies received. Along similar lines, Li and Shiu (2012) designed a diffusion support mechanism for selecting endorsers in social media, and tested its performance in measuring user preference through click-through rate, network influence by re-post rate, and propagation strength by exposure rate. The above sections show the variety of approaches that exist for determining how issues spread in social media.

Factors Influencing Dissemination in Social Media

To better understand what influences the spread of social media posts on the web, we further analysed the selected literature. This yielded various factors that may enable or hinder dissemination in social media. We then organized these factors, following a research model of communication in issue arenas (Vos, Schoemaker, &Luoma-aho, 2014) according to whether they concerned characteristics of issues,media or actors.

Characteristics of the Issues Involved

In a network or micro blog, all users have their own friends or followers. What posts are passed on also depends on what people like to share with each other. According to Wang (2012, p. 309), "If the message itself is valid and possesses high social value, it is likely that the message will be shared by many different users on multiple occasions, thereby increasing the instances of exposure". In the literature, various characteristics of an issue were expected to promote dissemination in social media.

- *Considered worthwhile*. Content is more likely to be shared in social media, for example by retweeting,if it is expected to benefit the receiver personally(Borge-Holthoefer et al., 2012), as for example, with health-related messages. Also favoured is content that increases knowledge (Desai et al., 2012), as it may provide a solution to a particular problem or offer the receiver "true value and benefit" (Bates & Riedy, 2012).

- *Expresses needs or emotions*. If a post relates to needs or emotions it is more likely to be passed on. "Emotionally charged Twitter messages tend to be retweeted more often and more quickly" (Stieglitz & Dang-Xuan, 2013). This may also apply to emotional experiences related to a product or service, for example, expressed in blogs, micro-blogs such as Twitter, and on YouTube ornetworks such as Facebook.

- *Has entertainment value or imparts a positive sentiment.* Qualities like humour enable the sharing of posts, for example allowing "participants to move from initial nervousness into more relaxed and comfortable conversations" (Byron et al., 2013, p. 40). Meanwhile, positive messages are generated and spread easily. For example, Desai et al. (2012, p. 4) noted in a study on re-tweeting messages about a conference, that a positive tweet "leaves a good impression with the reader and increases the likelihood that future tweets will be amplified by that reader".

- *Has news value.* A message that has news value, for example includes eye-witness accounts during a crisis, is more likely to be passed on (Hiltz, Diaz, & Mark, 2011). News content of social media messages may be related to a well-known organization (Williams et al., 2012) and the content positive, negative or neutral (e.g. Fan et al., 2013). It may also concern a well-known person or celebrity, as Sanderson & Cheong (2010) showed in a study on how high frequency posting and tweets facilitated the communication of grief after the death of Michael Jackson.

- People want to be identified with it. Consumers use social media to engage with brands, products and services they want to identify with (Williams et al., 2012). What users reinforce, for example by re-tweeting or 'likes', is often shown on their homepage. Since it adds to their identity, people may be opportunistic in what they wish to show and with whom they want to be seen to belong. How fast a message travels also depends on societal factors, which basically turns users into sensors (Stefanidis et al., 2013). Therefore, issues shared in social media are less likely to include topics related to taboos, as users do not wish to invite gossip or bullying, as "social media content is incorporated into broader practices of self-presentation and identity management" (Byron et al., 2013, p. 41).

The way issues take form in social media differs widely from that in news media, as it seems that people use social media especially from a personal perspective, to express their views, depict their experiences and share what they perceive around them, for example in eye-witness reports. Consequently, such motives then influence how an issue is communicated and takes form in the online environment.

Characteristics of the Media Involved

The particular features of the individual social media may facilitate diffusion of an issue on a smaller or broader scale. It should, for example, be noted that Facebook and Whatsapp are based on strong ties and emphasize the strengthening of friendships, while Twitter is primarily based on weak ties and is suitable for factual exchange (Zhao, Wu,& Xu, 2010). Social media have various features that enable fast dissemination, including ease of searching, sharing, and connecting with other users. Therefore, it matters from which social media platform the issue discussion has originated, although transfer to other social media platforms is possible and is more easily initiated in some social media than others. Mainly, however, diffusion depends on ease of sharing, ease of finding what one is looking for, and ease of connecting in the social media used.

Ease of sharing has to do with how well the online service facilitates exchange. Twitter's ability to signpost further materials (Kiernan and Wigglesworth, 2011) makes it easy to pass

on links to YouTube videos (Robichaud et al., 2012). Facebook in turn facilitates active involvement with friends, e.g. through 'likes' that strengthenrelationships(Rogers et al., 2012). The use of "likes" has also been used in campaigns to create weak ties.

Ease of finding what one is looking for, or posting matters that can easily be found by others, for example by using a hashtag on Twitter, is also related to ease of dissemination (Kiernan and Wigglesworth, 2011).

Ease of connecting may be higher in some social media services than in others (Bronstein, 2013). Users of Twitter are free to follow others, which also results in weak ties while, for example, WhatsApp is a more closed friendship environment. Consequently, Gruzd et al. (2011, p. 1294) note, that "connections on Twitter depend less on in-person contacts, as many users have more followers than they know". When ease of connecting is high, this may result in connections to an undeterminable degree and "constantly shifting clusters of conversations that have collapsed the traditional boundaries of space and time" (Farshid et al., 2011, p. 222).

Characteristics of Actor Resources forSocial Media

The actors involved in the issue-spreading process may be more or less connected, and more or less active in interaction on the web. Therefore, organizationsthat are successful in their use of social media will devote considerable *resources* to laying the foundation for their social media activities and involving other actors (Nah, & Saxton, 2013). They may do this by building platforms, content and followers, and developing ongoing monitoring and multi-channel approaches. In social media campaigns, organizations may want to spread matters widely, rapidly and/or to targeted groups by involving key-stakeholders (Suarez-Almazor, 2011), including not only policy makers and various public groups but also intermediaries through which relevant public groups may be reached. An organization can be supported in its online activities by *cooperating* with its (business) partners who may, for example, retweetimportant messages. How many are reached depends on the interconnectedness of the actors that provide the post or pass it on (Gruzd et al., 2011).

Organizations can form links with partners to increase their interconnectedness; this may include other organizations or, for example, bloggers.

Actors who often pass on social media posts to others are known as *influencers*. Such actors have the knowledge and willingness to support dissemination, for example, through tweet amplification (Desai et al., 2012). Following the growing interest in social media, organizations have begun to attributea profound role to influencers. Influencers with an established network in social media are also called 'social endorsers'(Li,&Shiu, 2012). Authority is attributed to those who are highly influential because they have many links with well-connected others; for example, if a blogger is highly influential "we would expect his ideas to propagate to other blogs" (Lawrence, Melville, Perlich, Sindhwani, Meliksetain, Hsueh,& Liu, 2010, p. 3). Since some bloggers have influence within a community, while others (also) have influence outside that community, measures are being developed to help organizations select the most suitableblogs for dissemination (Lawrence et al., 2010).

In social marketing practice, identifying influencers who are highly influential, also called *influentials*, is organization- and case-specific (Kumar,&Mirchandani, 2012), and thus the choice of influencers will often depend on the issue at stake.In purchasing decisions, customers maybe affected by *user-generated content* (Stieglitz,& Dang-Xuan, 2013), often referred to as 'consumer-generated media' or 'consumer-generated advertising' (Farshid et al., 2011). In that sense, consumers can be good influencers, as "a skilled consumer may offer a more compelling message that has more credibility than a company-generated message" (Williams et al., 2012, p. 129). However, Freberg (2012) found that user-generated sources are not always more effective, as their trustworthiness may be perceived differently according to users also depending on the topic. In any case, interconnectedness in the online environment is seen as a resource of actors.

A Model ShowingFactors that Enable Online Issue Spread

Below, based on the findings reported in the previous section,we present a model of the keyfactors that influence the diffusion of issues in social media. First, the model shows the *characteristics of an issue* that influence its rapid dissemination on the web, as it is thesecharacteristics that make it more or less attractivefor users to pass the message on. Second, the model shows the *socialmedia characteristics* that may also facilitate the rapid spreading of an issue. It matters from which social media platform the issue discussion originates, although there may also be transfer among different social media platforms.Third, the model shows the *organizational resources for social media,*influencing the preparedness of the organizationfor social media monitoringthat,depending on the issues management policy, may be geared towards a better understanding of stakeholder points of view or towards influencing the spreading of issues.

Next to these factors that relate specifically to the online environment, there are also factors of a more *general* nature related to societal developments and organizational reputation.For example, organizations should consider their *vulnerability* concerning issues and that issues related to them may travel more or less rapidly on the web. Such vulnerability could relate to societal factors or similar crises in the past, in the history of the organization or its (business) sector. Therefore, organizational reputation should be seen as an important general factor,just asdevelopments and power relations in the broader social environment that all may influence the interplay of actors in traditional as well as online issue arenas (Vos et al., 2014).

Together, these factors pull or push the discussion on the issue, explaining the speed at which the issue travels on the web, as shown in Figure 1. The centre of the model symbolizes the iterative process of reflection on the spread of social mediaposts to better understand the outcome of all these influences.Inspired by Rogers' (1995) model for the diffusion of innovations, we assume that in the various stages ofdissemination different actors may be active in the process, such as early adopters (or, for example, activists drawing attention to an issue), who may act and be perceived differently from the broader public, which may be

involved at a later stage. This would call for *continued assessment*, giving consideration to all the groups of factors throughout the lifecycle of the issue.

1. Issue characteristics

1.1 Considered worthwhile to share

1.2 Expresses needs or emotions

1.3 Entertainment value or positive sentiment

1.4 News value

1.5 People want to be identified with it

3. Media characteristics

3.1 Ease of sharing information

3.2 Ease of finding information

3.3 Ease of connecting

Spread patterns

2. Organizational resources and aims

2.1 Preparedness for monitoring

2.2 Cooperation with partners in social media

2.3 Engaging influentials

4. General factors (broader than the social media)

4.1 Societal and situational factors

4.2 Organizational reputation

Figure 1.Issue characteristics, media characteristics,organizational resources, andgeneral factors influencing the spread of an issue in social media.

The specific characteristics of the issue in question may promote or hinder fast dissemination on the web. Users will be more inclined to pass on a message if it is considered worthwhile for other users, expresses needs or emotions, has entertainment value or imparts a positive sentiment, or has news value, orrepresents somethingwith which they want to be identified. Media characteristics include ease of sharing, finding what one is looking for, and connecting. As the current trend is in the direction of closed environments (e.g. WhatsApp rather than Twitter), this may set thresholds for the dissemination (Rogers et al., 2012), cause a less free flow and hinder possibilities to monitor upcoming issues.Organizational resources and aims refers to preparedness forsocial media monitoring and activities, utilizing cooperation and engaging influentials.How these resources are used will depend on the organization's communication policy. This should be taken into account, not only with respect to the organization itself but also with respect to other actors in the issue arena (Luoma-aho,&Vos, 2010). The general factors in the model refer to societal factors that describe whether an issue relates to current interests, whether other issues are present that may dominate the news, and history and reputation of the organization.

First, the model can be used to better understand the challenges to monitoringintroduced by social media. Many organizations will be able to identify and follow a number of issues that may affect their operations, and the insights collected can help them make sense of a fast changing environment. When monitoring identifies new issues, the components of the model can contribute to predictingwhether such an issue is likely to grow. Second, the model can be used either to influence issuespread, for example by adding value to messages that will make them attractive for further dissemination or reinforcing messages posted bybusiness partners, or to decrease the likelihood of further dissemination by counteracting false rumoursor asking partners to refrain from enlarging attention to the issue. Nowadays, issues are not considered to be very 'manageable'. However, the fast moving environment of social media calls for sensemaking in organizations, reflection on new opportunities, and finding a balance that fits the organizational policies.

Conclusions

Social media provide users with new tools forsharing views. Issues can spread rapidly on the web, calling for anticipatory actions based on insights into spread patterns. Diffusion in social media is described in the literature, by means of analogies such as cascading or viral spreading, by comparing it to the adoption of innovations, by reference to network patterns and roles, or by means of mathematical models.In the literature,various factors,from various perspectives, are mentioned as influencing issue spread, providing a fragmented and complex picture of the topic. In this paper,these factors are compiled to provide a more holistic view of this current topic from an organizational perspective.

The articles that described how issues spread in the media often focused on a particular instance and the process of diffusion of a single issue or message. A clear event is often the starting point, for example the crisis that accompanies a product recall. As time goes by, the diffusion process may break down, or the topic may possibly re-appear in the online discussion whena related matter pops up. There may be no such clear event at the endpoint, leaving the possibility of a return of the topic (or a similar one) open. For an organization, an issue is not a one-time event, and hence monitoring should alsocover successive or overlapping issues.

Limitations

The literature search was limited to refereed journals and, despite spanning 10 years, yielded only articles published after 2009, showing that the topic is of current concern. An online search revealed some recent conference proceedings with additional input on thetopic, e.g. Choudhury, Lin, Sundaram, Candan, Xie and Kelliher (2010) who show how sampling methods can influence the spread patterns found in the currently large volume of social media data.

The model presented here may help organizationsto interpret the results of social media monitoring and to reflect on the possibilities of social media interventions. However, more research is needed to show which factors are more important than others.For example, in a

case study published in conference proceedings,Yang and Counts (2010) found that tweets that came later during the observation period and those that included links often travelled further in the network. There might also be a threshold for diffusionin social media, resembling that inepidemiology, wherea minimum number of infections is required to increase the probability of a disease spreading to the whole network, oras in game theorywhereaninnovation needs to attract a minimum number of adoptees before its utility for other prospective usersis at a high enough level to induce them to adopt itas well (Song, 2013).

Directions for Future Research

Current mathematical models focus on the spread of individualmessages, for example, in random diffusion, whereas the various complexities related to the spread of organizational issues in social mediahave yet to be taken into account. Changes in messages as they are passed need to be further investigated, as some authors state that in this process the message content becomes adapted in a more negative or positive direction, or to suit a broader public (Fan et al., 2013; Newsom,&Lengel, 2012).

We also argued that transfer within different social media and with traditional news media needsto be taken into account.Moreover, interference between the traditional news media and social media is not reflected in the models. For organizations, it is relevant that issue transfer between social media and traditional news media exists (Meriläinen,&Vos, 2013), although it has been suggested that this needs to surmount a threshold in order to gain momentum, rather like the threshold described in the diffusion of posts in, for example, Facebook (Rogers et al., 2012).

Implications for Practice

When companies monitor social media, the results may reveal various issues related to organizational policies. However, monitoring in itself does not clarify what issues mostly need attention. This needs a better understanding of the factors that determinewhether an issue can

be expected to develop rapidly.The model presented here brings together current insightson the diffusion of social media posts and provides input for decision-making on communication strategies and a more critical outsourcing of related monitoring services, by enhancing understandingof the principles of diffusion.In the social media environment, above all, it is interconnectedness that counts.

Acknowledgements

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Study III, Paper 3

UNDERSTANDING FAST DIFFUSION OF INFORMATION IN THE SOCIAL MEDIA ENVIRONMENT: A COMPARISON OF TWO CASES

By

Boyang Zhang, Alexander Semenov, Marita Vos & Jari Veijalainen, 2014

Study IV, Paper 4

**DECOMPOSING ISSUE PATTERNS IN CRISIS
COMMUNICATION - THE CASE OF THE LOST AIRLINER**

By

Boyang Zhang, Marita Vos & Jari Veijalainen (in press)

Study IV, Paper 5

ONLINE STAKEHOLDER
INTERACTION OF SOME AIRLINES IN THE LIGHT OF SITU-
ATIONAL CRISIS COMMUNICATION THEORY

By

Boyang Zhang, Denis Kotkov, Jari Veijalainen & Alexander Semenov, 2016

Study V, Paper 6

**THE ISSUE ARENA OF A
CORPORATE SOCIAL RESPONSIBILITY CRISIS - THE
VOLKSWAGEN CASE IN TWITTER**

By

Boyang Zhang, Marita Vos, Jari Veijalainen, Shuaiqiang Wang & Denis Kotkov,
2016

The Issue Arena of a Corporate Social Responsibility Crisis – The Volkswagen Case in Twitter

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Abstract

This paper explores the online debate in a corporate social responsibility crisis, where multiple actors communicate through social media, each representing different interests and views pertaining to the crisis. The study utilizes Twitter data relating to the recent case of the falsified Volkswagen diesel emissions that became public in 2015. To better understand the online interaction, use is made of issue arena theory and insights on CSR crises. The focus is on capturing the issue as it evolved over time, the actors and sentiments expressed, and the responses of the organization. The findings show that after the case became public, the emissions issue received massive attention in Twitter. Sentiment analysis showed high negative peaks following news that revealed details about the case. Among the most active external accounts, the group labeled General and business news was the most critical. The replies posted by Volkswagen on @VW were few, providing explanations and links. Volkswagen websites were used to disseminate information, but the case was also heavily discussed in a large number of independent discussion platforms, blogs and wikis. The findings demonstrate that CSR challenges can result in a crisis of a long duration marked by strongly expressed sentiments and a wide diversity in the views of different stakeholder groups. The focal organization reacted to the events with the twin strategies of apology and compensation. The study shows the risk of CSR challenges resulting in crises in cases where stakeholder expectations have been created but not met, generating loss of reputation.

Keywords: corporate social responsibility, crisis communication, issue arena, social media, Volkswagen

1. Introduction

The effects of organizational crises have received attention in sustainability policymaking by organizations. Corporate Social Responsibility (CSR) has importance for benefitting society beyond the profit interests of companies (Coombs & Holladay, 2015). With the evolution of CSR at the organizational level, CSR has been raised to a performance-oriented management perspective in organizations (Lee, 2008). A considerable amount of research has been carried out on organizational CSR, while relatively less attention has been paid to online CSR challenges. It is of interest to further investigate a case where a CSR challenge became a crisis, as suggested by Coombs and Holladay (2015) who argue that CSR communication raises expectations and, therefore, can also be seen as a risk.

This research evaluates interaction as it evolves in issue arenas, understood as places where multiple actors discuss issues they have a stake in (Luoma-aho et al., 2010). These are, by other authors, also called rhetorical arenas for multi-vocal communication (Frandsen & Johansen, 2008; Coombs & Holladay, 2014). Social media provide platforms where such an exchange of views involving different stakeholder groups can take place.

The study uses Twitter data to gain insight into the evolving debate, the sentiments of the tweets exchanged about the issue, the most active accounts, and sites of interaction by the focal organization.

This article reports on a case study of the Volkswagen Group emission scandal that broke in 2015. The actions taken by Volkswagen are assessed from the perspective of CSR, as irresponsible actions damage reputation and consumer trust. The interests of internal stakeholders and highly competitive business targets may have led to the events precipitating the crisis.

2. Theoretical Background

This section reviews the importance of multi-actor online interaction in the social media literature. Thus far, few studies have attempted to explain online stakeholder interaction in CSR crises. This paper attempts to enhance understanding of online discussion as it evolves in the case of an organization faced by a CSR challenge. Social media debate tends to show high activity levels and the expression of strong sentiments during such organizational crises.

2.1 Evolving CSR Issues in Social Media

Organizational issues are topics debated in public that relate to a focal organization, which in turn may use issues management to track such topics so as to more effectively interact regarding them. Online issues are widely recognized as formed by social media discourse (Henderson & Bowley, 2010; Keim, 2011; Pavitt, 2012), and organizations have begun to note the importance of monitoring social media use (Sedereviciute & Valentini, 2011), as a basis for constructing communication strategies to connect with the different stakeholders (Zhang & Vos, 2014).

Social media sites support the fast diffusion of information by allowing instant publication in various formats (Kombol, 2014). Organizations should be aware that negative issues in particular tend to diffuse virally online, especially when the negative contents relate to problems caused by socially irresponsible organizations (Lee, Oh & Kim, 2013). A crisis may arise when an organization is scrutinized critically by its stakeholders (Pang, Hassan & Chong, 2014), having a profound impact on the organization's reputation (Sriramesh, Rivera-Sánchez & Soriano, 2013). Some crises have been triggered by a huge amount of online user-based messages, when accusations against a focal organization stimulated viral spreading of negative issues (Pang et al., 2014).

Accordingly, Dekay (2012) recommends serious consideration of the views of different audiences, such as fans and hater groups, with fans in the role of defender of the brand and haters attacking it. For this purpose, Luoma-aho (2015) introduced, next to the concept of stakeholder, the concepts faithholder and hateholder. Research on such groups can help evaluate the impact of social media on social legitimacy (Bonsón & Ratkai, 2013). For example, a study showed that loyal customers of Toyota enhanced brand reputation on social media sites during the recall crisis in 2009 (Byrd, 2012).

Curley and Noormohamed (2014, p. 62) defined CSR as "a trend in corporate policy which serves as a self-regulatory guide to socially and environmentally responsible business practices". CSR focuses on balancing social responsibilities with profitable organizational activities, and is based on sensemaking, negotiations and dialogue (Schultz & Wehmeier, 2010). The search for social legitimacy is consistent with the disclosure of CSR (Bonsón & Ratkai, 2013). Legitimacy is seen as congruence between the corporate CSR agenda and stakeholders' social expectations (Colleoni, 2013), that is, a balance between company interests and the common good. As CSR comprises several themes, Bonson and Ratkai (2013) categorized it into major points of attention, including environmental, social and financial aspects, and governance. Similarly, Kolk (2016) emphasized the environment, ethics, rights and responsibilities, as well as poverty and sustainable development. Organizations that act indifferently to the expectations of stakeholders regarding its CSR can harm their reputation (Pavitt, 2012). Generally, CSR activities have developed from primarily using traditional media to including social media (Sharma, 2012), for example, by participating in Twitter, Facebook, YouTube, Google+, and WhatsApp.

Transparency can underpin organizational long-term commitment to CSR (Curley & Noormohamed, 2014), whereas unfavourable hidden actions by organizations are easily revealed publicly with both immediacy and extensive coverage (Pavitt, 2012). Transparency benefits from the synchronization of content developed for different channels, taking both traditional and social media into account to enhance stakeholder engagement (Diers & Donohue, 2013). The content of organizational messages along with channel selection, often follows the intentions of the organization (Koenig, 2014), but this content needs first and foremost to relate to stakeholders' voices as expressed in social media and other channels. As Pavitt (2012) suggests, here the corporate ownership of social media platforms and the general lack of control over their content should be taken into consideration.

CSR activities have commonly been seen as promoting organizations' competitive advantages. Recently, however, Coombs & Holladay (2015) introduced the concept of CSR challenge and postulated that CSR communication can regarded as a potential crisis risk (Coombs & Holladay, 2015). Organizations with highly creditable CSR themes find favor among stakeholders online (Lee et al., 2013), and as a result their CSR communication may raise public expectations (Schultz & Wehmeier, 2010). When reality does not meet such expectations, CSR may switch from being an advantage to being a risk, at worst resulting in negative sentiments and considerable reputation damage. In this way, a triggering event such as negative information becoming public, may turn a CSR challenge into a profound organizational crisis. In other words, CSR claims cannot be made lightly, as they create additional responsibilities and expectations.

2.2 Multiple Actors in Issue Arena Communication

In social media, various stakeholders engage in debate on organizational issues, and hence nowadays organizations also utilize social media for communication purposes (Bonsón & Ratkai, 2013). Compared to traditional media, a unique characteristic of social media is its potential for multi-actor interaction, which makes it even more important that organizations are aware of stakeholders' sentiments (Byrd, 2012).

Issue arena theory was developed with a fast-changing environment, and especially virtual media, in mind (Luoma-aho & Vos, 2010). It aims at understanding the complexity of issue debate. Online interaction on issues is co-created by various actors with different interests and points of view (Vos, Schoemaker & Luoma-aho, 2014). Monitoring activities can amplify the voices of various external stakeholders when concerns about the performance of the focal organization begin to arise. In social networks in particular, the roles of influentials such as bloggers and scholars are interesting in this respect (Van den Hazel, Keune, Randall, Yang, Ludlow & Bartonova, 2012). Similarly, public and private organizations other than the focal organization may play an essential role in the debate on an organizational issue.

To understand the course of a particular issue debate, next to the actors involved, the places of interaction also need attention (Vos et al., 2014), as differences between the different social media have to be taken into account. For example, Twitter is the social media tool most commonly used to disseminate news information, as it is easy for anyone to follow a Twitter account. This has resulted in influential users with millions of followers (Sharma, 2012), without any need for the two-way acquaintanceships required by other social media tools, such as WhatsApp (Sedereviciute & Valentini, 2011). Tweets have a limited number of characters and, therefore, redirect links are often included in them to enable access to background information on, for example, YouTube or websites (Sriramesh et al., 2013).

In Twitter, the co-creation of the discourse on an issue occurs when different actors address different aspects of the debate. Tweets can be characterized as microblogs that enable fast realtime exchange of information (Zhang & Vos, 2015), and hence interactivity in Twitter refers to fast retweeting and replying, often involving large numbers of users (Kwak, Lee, Park & Moon, 2010). Twitter is suitable for realtime news publishing from different points of view, including eye-witness reports. It can be seen as a weak-ties network with active user interaction, whereas social networks such as Facebook are strong-ties social networks with more personal information exchange and less public discussion (Fischer & Reuber, 2011). Moreover, users of Twitter are free to follow others whereas, for example, WhatsApp is a messaging app in a closed friendship environment. All of this, including the fact that Twitter has an archive function, meaning that tweet collection can go back in time, explains why research on the spread of issues in social media often focuses on Twitter, especially when it concerns crises (e.g. Li, Vishwanath & Rao, 2014).

It is important for sustainable development that an organization is able to foster trust in its diverse stakeholders (Byrd, 2012), and listen not only to the voices of stakeholders who are financially interested in the organization, but also to those of all the other relevant stakeholders (Pavitt, 2012). This may enable an organization to prevent or survive a crisis (Byrd, 2012). As a lack of transparency in an organization can trigger critical misunderstandings, organizations also need to pay attention to the interaction between employees in different departments. Internal communication with managerial support can enhance awareness of CSR within an organization. Among an organization's external stakeholder groups, publics are seen as citizen audiences who help the organization to keep in mind the importance of the common good (Sriramesh et al., 2013), alongside other external stakeholder groups such as clients and shareholders with their own interests and points of view.

2.3 Crisis Response and Interactivity

Responding to organizational crises includes reduction of (further) damage to stakeholders, and crisis communication aimed at corporate image repair (e.g. Benoit, 1994). Various communication strategies may be used. Different types of response strategies have been identified in the Situational Crisis Communication Theory (SCCT), including attack the accuser, denial, scapegoat, excuse, justification, compensation, and apology (Coombs, 2007). SCCT links recommended strategies to different crisis situations. In a complex crisis multiple response strategies may be needed.

In crisis communication and issues management, rather than reacting to stakeholder views, a proactive attitude is recommended, where the organization leads rather than follows in the interaction, for example, by explaining events in a timely way and preferably before they have been brought to public attention by others (e.g. Heath & Nelson, 1986; Coombs, 2007). Online interaction by the focal organization can reveal its chosen response strategies.

Organizations monitor the discourse to be able to reply, which is also increasingly expected by users. The direct engagement between an organization and its stakeholders in a social media debate demonstrates the dynamics of stakeholder relations (Fieseler & Fleck, 2013). Among the places of interaction, the official social media sites of the focal organization merit special attention (Byrd, 2012; Henderson & Bowley, 2010). Social media offer good possibilities to facilitate two-way communication (Wright & Hinson, 2009); however, these remain underused as

one-way information tends mainly to be posted (Coombs, Falkheimer, Heide, & Young, 2015). Such potential for dialogue and an "architecture of listening" needs to be used to regain trust and rebuild relations with stakeholders (Macnamara, 2016). It has been suggested that two-way communication is critical on the web and that, for example, companies that are active online receive fewer negative mentions in Tweets but only if they engage in real dialogue (Wigley & Lewis, 2012).

Recommendations for interaction on issues emphasize that dialogue-related strategies are adequate to cope with unfolding concertative interaction (Romenti, Murtarelli & Valentini, 2014), such as in crisis situations, where the voices of online users can be catagorized into separate agendas for the formulation of specific crisis response strategies. Collaborative and active online interaction may help to build and maintain relationships between an organization and its stakeholders characterized by high levels of trust and transparency (Cox & McLeod, 2014), as social media tools may facilitate both bonding with close ones and bridging of weak links (Chang, 2015).

3. Research Method

This section opens with a brief case description. Next, the research questions are listed, followed by the collection of the Twitter data set and the analytical methods applied.

3.1 Case Description

The Volkswagen emission scandal triggered a heated debated on September 18th, 2015. The United States Environmental Protection Agency (EPA), which aims at the safeguarding of human health and environment, accused the Volkswagen Group of equipping specific models of diesel vehicles with defeat software designed to enable them to successfully pass emission tests in a laboratory or vehicle inspection station, whereas under normal driving conditions the levels of nitrogen oxide pollutants were in some cases up to 40 times higher than the legal limit, violating the Clean Air Act. and resulting in the manufacturer being fined of several billions of U.S. dollars. On the global market, approximately 11 million cars were equipped with the same defeat software. After the case became public, the Volkswagen Group reacted by admitting the deception and making public apologies. Michael Horn, then CEO of the Volkswagen Group of America was replaced, and Christine Hohmann-Dennhardt added as board member for Integrity and Legal Affairs. The company paid compensation to car owners in the U.S., and planned a massive recall in 2016 to correct the problem in affected cars worldwide. The image and reputation of the Volkswagen Group was severely affected by the emissions scandal (Zhang, Veijalainen & Kotkov, 2016), with sales and stock prices dropping sharply. Volkswagen had been seeking entry to the U.S. market for its diesel automobiles, calling them 'clean diesel' on account of their low carbon dioxide emissions. However, the ceiling on nitrogen oxide emissions was even lower in the U.S. than in Europe. The company had been nominated for a CSR award before the case became public. Emission test results have raised suspicions before, but in this case software had been added to defeat the test conditions and artificially maintain the emission levels registered below the permitted limits.

3.2 Research Questions

This case study was conducted to demonstrate the complexity of CSR challenges and related crisis discourse in a multi-actor online environment. The Volkswagen emission scandal developed over a long period of time and shows how multiple interests joint the online debate. The research questions were designed to clarify the course of the debate, sentiments expressed, active accounts and replies by the focal company.

RQ 1: How did the debate on the Volkswagen emissions evolve over time? (This question concerned the fluctuation in the numbers of tweets about the issue over time, as well as their sentiments.)

RQ 2: How can the most active external actors be characterized? (This related to the most active accounts, how these are distributed in stakeholder groups, and the sentiments expressed in the tweets sent by these groups.)

RQ 3: What response strategy can be deduced from the replies by Volkswagen? (This focused on the interaction by Volkswagen, and in particular the replies sent via Twitter.)

3.3 Collection of Twitter Data

The data set for this study mostly relies on Twitter. As already discussed, Twitter is one of the largest online social network platforms and the social media tool most commonly used to disseminate news information. It allows researchers to retrace realtime interaction over a period of time, to follow how an issue evolved. However, in addition, Facebook and some online discussion platforms were also looked at and the results are reported here in brief.

The Twitter data set was collected by relying on the Twitter Streaming API. The software used was Tweepy v2.7 and Tweepy v3.5 (see http://www.tweepy.org/). Over time, different selection predicates were used, as the most relevant keywords changed over time. The first selection predicate was stream.filter (track=['vw volkswagen', 'scandal', 'reputation', 'diesel', 'software']). Very soon the hashtags #dieselgate and #vwgate emerged in tweets that referred to the

crisis. Therefore, those hashtags were added and the stream.filter (track=['vw', 'volkswagen', 'VWgate', 'dieselgate']) briefly used. During autumn 2015, the term "emission fraud" also emerged. At the end of September, the selection predicate was changed to the stream.filter (track=['vw', 'VW', 'volkswagen', 'Volkswagen' 'scandal', 'reputation', 'dieselgate', 'vwgate', 'emission', 'fraud']). The stream.filter (track=['vw', 'volkswagen', 'scandal', 'reputation', 'diesel', 'software', 'vwgate', 'emission', 'fraud']) was also used to test the capture power in parallel. From December 2015 onward, the following selection predicate was used: stream.filter (track=['vw', 'VW', 'volkswagen', 'Volkswagen', 'scandal', 'reputation', 'dieselgate', 'vwgate', 'emission', 'fraud']).

The number of different tweets amounted to over 13 million between September 23rd, 2015 and June 23rd, 2016 in the raw data set. Many non-relevant tweets were found among those collected, including advertisements, sales information, synonyms, tweets in German and other languages, and so on. Therefore, as a next step, a filtering process was conducted to focus on the tweets in English where the text contained words included in the following predicate: (@VW or @Volkswagen) or (('olkswagen' or 'vw' or 'EA189' or 'VW') and ('oftware' or 'candal' or 'iesel' or 'gate' or 'pollut' or 'raud' or 'fine' or 'stock' or 'mission' or 'heating' or 'CEO' or 'share' or 'hief')).

The data set contained a total of roughly 1,046,000 qualified and thus relevant tweets by June 23rd, 2016. The present results are based on this data set or a subset of it. The data collection from September 23rd, 2015 to February 11th, 2016 was almost continuous; thereafter, data were not gathered as regularly. Gaps of a few weeks occur and no data were collected during May 2016. The collection was restarted on June 18th and reporting terminated on June 23rd, 2016.

3.4 Data Analysis

Several quantitative textual analyses were conducted to capture the complexity of the case, and enhance the accuracy and reliability of the results. To gain insight into how the Volkswagen emissions issue evolved over time, a frequency graphic of tweets during the research period was constructed. Next, a sentiment analysis of the tweets during the research period was conducted. This was done by scoring the textual content of the tweets, customizing the procedure of R-studio (http://www.r-bloggers.com/twitter-sentiment-analysis-with-r/). The latter provided a way of thinking, but several adjustments were made to meet the requirements of the case data, including the readline and timing techniques. The inclusion criteria were that that the language of the tweets is English and the Boolean value of each tweet is true. The presentation of the sentiment analysis focuses on the positive and negative scores.

To better understand the active actors other than the focal organization, the 15 most active external accounts were identified based on the number of related tweets, not including Volkswagen-verified accounts or accounts controlled by the company. The data were filtered on June 23rd, 2016. The accounts were examined, to provide a brief description and, based on the latter, grouped. Next, a sentiment analysis was conducted to characterize the tweets of the most active accounts. The tweets were scored, again customizing the procedure of R-studio.

To investigate the replies by Volkswagen, the Twitter accounts were listed and the account @VW was selected, as this had the most followers, showed first in a Google search, most often had a bearing on the case and was the most interactive. The number of replies was noted and a Word Cloud, using https://www.jasondavies.com/wordcloud/, was made to gain an initial insight into the content of the replies. Next, the replies were categorized by grouping similar elements, using the keyword search, into one category.

Additionally, a brief analysis was conducted of the Volkswagen Facebook chat platform to see how many replies Volkswagen provided there, using Graph API (https://developers.facebook.com/docs/graph-api) with a Java program to filter relevant comments plus replies. In addition, a Google Search (www.google.com), testing several key words, was conducted on November 9th, 2015 to gain an idea of the extent to which other types of social media, such as forums and blogs independent from the focal company, were being used for interaction about the Volkswagen emissions issue.

4. Findings

First, the numbers of tweets in the Twitter data set are shown by date. Second, the results of the sentiment analysis of tweets, providing an insight into the tone of voice of the tweets over time, are presented. Third, the results of the analysis of active accounts, showing who were active in Twitter, are presented. Fourth, the replies by Volkswagen are discussed.

4.1 The Evolving Crisis as Shown in Twitter

Using the data set collected a cure graph was constructed to show the fluctuation in the volume of tweets pertaining to the case during the research period. Figure 1 shows the changes in volume from September 23rd, 2015 to April 8th, 2016.
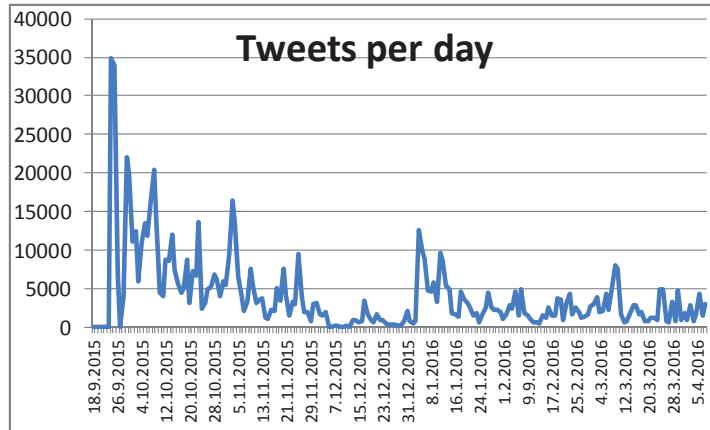
Figure 1. Twitter data set collection

On September 24th, 2015 the number of tweets rose sharply, reaching 34,000-35,000 related tweets on the next day. After the news about the case became public, the numbers of tweets per day remained relatively high for more than a month. (The low number on September 26th, 2015 was caused by a server crash lasting 48 hours which caused a minor interruption in the data collection.) As might be expected, after the initial peak the figure shows a steady decrease. A further peak of 21,956 tweets occurs on September 29th, and another of 20,343 tweets on October 8th. Thereafter, the number of daily tweets remains below 20,000. However, it is noticeable that the Volkswagen emissions issue remains active over a long period. This indivates the severity of the crisis for Volkswagen.

To better understand the development of sentiments over time, an overall sentiment analysis was conducted. The results are shown in Figure 2.
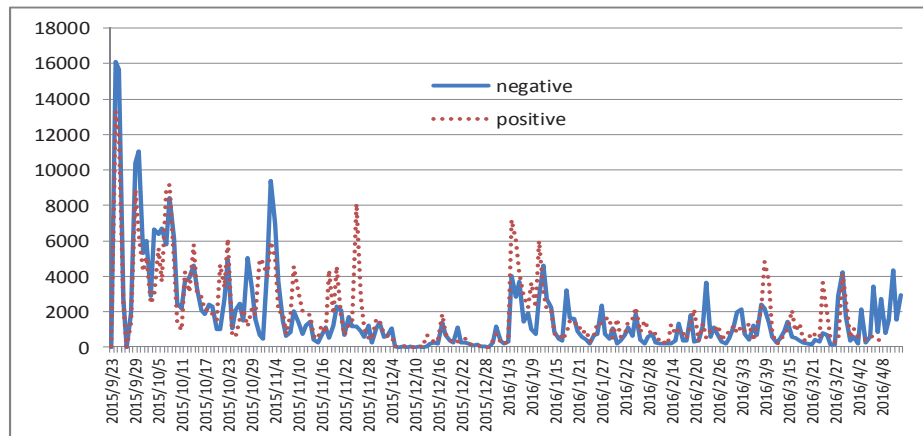
Figure 2. Sentiment analysis of Tweets over time

Figure 2 shows that in the first days of the crisis many negative tweets were posted (aspects of CSR aspects were often referred to in the tweets and disappointment showed). The negative peaks seem to follow the news on the case, until the interest in the item in question died out. For example, a negative sentiments peak occurs on November 3rd, 2015, one day after the announcement that the EPA had found more Volkswagen models with 3.0 TDI engines that had the defeat software. New negative sentiments peaks arose as more details became known, for example following the apologies and confirmation of the facts by CEO Winterkorn on September 22nd, 2015.

Positive sentiment peaks are also present, for example after apologies and clarifications were given by the new CEO Müller on January 1st, 2016. In general, it should be noted that the sentiment analysis may over-represent positive sentiments, as it is based on the words used (e.g. "bad" or "good") and classifies many statements (such as "violating

the law") as neutral. Moreover, negative tweets such as personal complaints may be retweeted less often than neutral news feeds or positive tweets including recommendations.

4.2 Active Stakeholder Accounts

A multitude of accounts on Twitter, representing a diversity of interests, including, for example, retailers, news media, and consultancies, co-created a voluminous multi-actor discourse on the Volkswagen emissions issue. An actor analysis was performed to find out which types of stakeholders were most active in Twitter. The focus was on external accounts, excluding any verified accounts of Volkswagen or accounts controlled by the focal company. The 15 most active external accounts for this topic are listed in Table 1, ranked according to the numbers of tweets sent during the research period.

Table 1. Most active external accounts

Most active external accounts (31.05.2016)	Links	Number of tweets
1. wallpapers7	https://twitter.com/wallpapers7	2494
2. Sufiy	https://twitter.com/Sufiy	1721
3. IPandHuf	https://twitter.com/IPandHuf	1576
4. OnlineCarReview	https://twitter.com/OnlineCarReview	1479
5. kirillklip	https://twitter.com/kirillklip	1142
6. AutoNewsBot	https://twitter.com/AutoNewsBot	1124
7. pautoappraisers	https://twitter.com/pautoappraisers	1079
8. MoneyNews24h	https://twitter.com/MoneyNews24h	952
9. UsedCars4sa	https://twitter.com/UsedCars4sa	712
10. ooyuzaudi	https://twitter.com/ooyuzaudi	709
11. InvestingLatest	https://twitter.com/InvestingLatest	700
12. RealTimeHack	https://twitter.com/RealTimeHack	700
13. Autotestdrivers	https://twitter.com/Autotestdrivers	679
14. testdrivernews	https://twitter.com/testdrivernews	678
15. neils_rt	https://twitter.com/neils_rt	665

Each of the top 15 active external accounts for the Volkswagen emissions issue has posted a considerable number of tweets during the research period. To further analyze these accounts, a brief description of each account was given. Next, similar accounts were grouped and labeled (see Table 2).

Table 2. Groups of the most active external accounts

Automotive organizations:	Consultancies:	Online car journals:	General and business news:
UsedCars4sa (used cars for sale in South Africa)	kirillklip (investment advice)	IPandHuf (car news and technology)	wallpapers7 (global news)
Autotestdrivers (automotive test drivers)	pautoappraisers (car appraisals)	OnlineCarReview (new cars)	Sufiy (investment news)
testdrivernews (automotive testing)	InvestingLatest (insights for investors)	AutoNewsBot (up to date automobtive news)	MoneyNews24h (financial news)
	neils_rt (consultancy info)	ooyuzaudi (car news)	RealTimeHack (news services)

To investigate the tone of voice of the messages posted by the top active accounts, a sentiment analysis was implemented. After listing the sentiment scores for the 15 most active accounts, we collated the results per group. The findings are presented in a stakeholder map (see Figure 3) with the positive and negative sentiment scores as axes, showing clear differences between the groups.
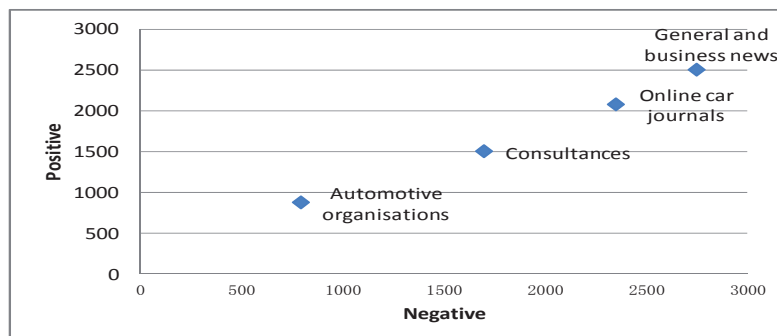

Figure 3. Map showing the positive and negative sentiment scores of the groups

Negative sentiments occur most in the group General business news, and positive scores most in the group Automotive organizations. Only a few accounts show high numbers of both positive and negative comments, but in the fall of 2015 this was the case for wallpapers7, which focuses on information for shareholders.

The General and business news accounts include many critical comments, which can be understood in the light of the financial repercussions of this crisis. For example, @wallpapers7 posted on September 25th, 2015: "http://t.co/ReIBXg0QpV #Hash4Tags RT rodbishop15: #Pensioners who have had their funds invested in #VW shares should be fuming. #Volkswag\u2026"; and "http://t.co/ReIBXg0QpV #Hash4Tags 27 US states plan to subpoena #VW via Business http://t.co/UMjgR42Oup http://t.co/Dh1sT0SRKK".

The group of Automotive organizations posted many statements with neutral or positive sentiments. For example, on October 7th, 2015, @UsedCar4sa posted "'VW Group CEO Matthias Muller Confident About Overcoming Crisis\nNewly appointed VW Group CEO Matthias Muller has... http://t.co/yBBTYRJwd9".

For the 15 most active external accounts combined, negative scores form 52% of the total sentiments measured, whereas the corresponding proportion of the overall results in Twitter, which also included accounts owned by the Volkswagen Group, was 48%. Thus, the most active external accounts show, like the overall Twitter results, a high level of negative sentiments.

4.3 Social Media Interaction by the Focal Organization

To understand the response of the focal organization, @VW, the Volkswagen U.S. verified account with approx. 450K followers in Twitter, the number of replies was calculated. The result showed that, in total 581 tweets were posted during the whole research period by @VW, 499 were replies.

To gain an initial insight into the content of the tweeted replies by @VW, we used Word Cloud. The result is shown in Figure 4.

Figure 4. Word cloud of replies by @VW replies

Words like "sorry" stand out in the word cloud constructed from the replies. Some examples of the tweeted replies from @VW follow.

@tylapper: "You can Live Chat with us at https://t.co/elor7ebi6a or give us a call at 800-822-8987."

@Dezlboy: "We''d be happy to look and see if there are any recalls on your VW. Please reach out to us at https://t.co/elor7ebi6a so we can check."

To get more insight into the content of the 499 replies, some of which combined two types of reply, we categorized them. The following 4 types of reply were found: (a) acknowledgements or greetings in various contexts, such as welcome or thank you (303 replies); (b) redirecting people to other sites by links (268 replies); (c) apology making and/or explanatory (167 replies); and (d) referring to services (86 replies). However, it should be noted that total number of replies in the Twitter Account @VW was not high.

Although other social media were outside the focus of this study, we collected some additional data to see if these matched the picture gained from Twitter. We found, similarly, that the Facebook page of Volkswagen did not show many replies by the Volkswagen Group (https://www.facebook.com/VW/?brand_redir=DISABLE). We collected in total 60 posts published from September 17th, 2015 until April 11th, 2016, along with 17,357 comments and 9,553 replies that related to the posts. However, very few of these replies were by Volkswagen. In fact, for the whole research period of 203 days only 103 replies by Volkswagen were found. Thus, Volkswagen was not very active in replying on its Facebook page either.

Mainly, Volkswagen issued information through its websites. Six Volkswagen websites were found that related to the emissions issue and, for example, the recalls. The official VW websites have recently been studied by Zhang et al. (2016). They found less interaction with the public than reported here concerning Twitter or Facebook, as the web focus was on informing about solutions, customer services and press releases.

Online, the Volkswagen emissions issue was discussed on many other sites. A Google search yielded, next to many news-related items (for example, "VW sinks deeper into the mire"; "The scandal explained"), at least three highly active discussion platforms, and six blogs or wikis. As expected, the Internet showed multi-actor discussion, with many actors posting messages on many different platforms, and deeper interaction among some users on fewer discussion platforms. The latter concerned the immorality of cheating in the emission tests, trends in emission norms, and consequences for citizens and industry. Examples are a blog titled "VW deception not an isolated case and not just the auto industry", a wiki "VW TDI diesel emissions test cheating FAQ and timeline", and a discussion chat platform on "VW's emission scandal over the TDI engines".

Online, people discussed this case on many different platforms, creating an even more voluminous discourse than the messages collected solely from Twitter, which demonstrates, on the one hand, the challenging nature of such issues for the focal organization and, on the other hand, how much the Volkswagen emissions issue meant to stakeholders.

5. Discussion and Conclusion

The findings underline the importance of Corporate Social Responsibility (CSR) in the sustainable development policies of organizations, but also the risk of CSR challenges resulting in crises where stakeholder expectations have been created but not met, generating loss of reputation.

After the issue of the falsified Volkswagen emissions became public, it received massive attention in Twitter. The sentiment analysis showed high negative peaks following news items that revealed details on the case, but positive sentiments were also present depending on the interests of the accounts. The 15 most active accounts showed divergent sentiment scores, the group General and business news being the most critical. The replies posted on @VW were not many; they mostly contained greetings, explanations and links. Several Volkswagen websites were used to provide information, for example, which vehicles were affected and when repairs could be expected, but the Volkswagen emissions issue also continued to be heavily discussed in a large number of independent discussion platforms, blogs and wikis.

As an example of a CSR Challenge, the issue was characterized by a long period of strong sentiments. This accords with the approach by Coombs and Holladay (2015), who noted that when behavior by a company with a previously positive CSR reputation is confirmed to be socially irresponsible, this can lead to heated public debate. In the case of the Volkswagen emissions scandal, the CSR-based challenge began after it became known that defeat software had been used to falsify emission test readings, making diesel cars appear less polluting than they were. The earlier claim by Volkswagen to be marketing clean diesel cars now seemed greenwashing, and thus had strong potential for reputation damage.

The Volkswagen Group had earlier been known for fuel-efficient cars and engagement in CSR. Scholars (e.g. Schultz & Wehmeier, 2010) agree that when an organization engages in CSR communication it may encounter raised public expectations. It can be concluded that, because the emissions scandal violated stakeholder expectations regarding fair and sustainable business policies, it led directly to a CSR crisis. Thus, Volkswagen AG's stock was immediately removed from the Dow Jones Sustainability indexes after the news about the emissions defeat software broke on September 18th, 2015.

The CSR challenge was also characterized by the involvement of many different actors in the online debate. The discourse showed the diversity of the positions taken and sentiments expressed by the main active accounts. This may typify CSR-related issues, as CSR policies seek to take different interest groups into account, bridging these through dialogue where possible (Schultz & Wehmeier, 2010). In the Volkswagen case, we noted different views by actors in the car industry and those in the news media. Individual tweets also reflected the positions of faith- and hateholders (Luoma-aho, 2015). The long duration of the issue can be explained by the fact that this CSR challenge led to legal and

administrative procedures resulting in a series of news events that the stakeholder groups in turn discussed online, showing continued strong sentiments over a long period with peaks when new information became public.

Finally, the response strategies of this example of a CSR challenge included types mentioned in the SCCT literature. It is no wonder that a clear failure to deliver CSR promises is answered by voicing apologies and compensation. Some of the reluctance to engage in these, as noted above, may relate to the severity of the financial and legal consequences. The aim of crisis response strategies is to enable the organization to recover quickly from a crisis and prevent similar crises in the future. In the case of the Volkswagen emissions issue discussed here, the company's response strategy could have been more proactive. In the period before the defeat software became public, Volkswagen had initially denied research results that had shown high emissions. There also were tweets rumouring that evidence had been deleted.

After the case became public, the Volkswagen strategy can be characterized, following the types identified in the Situational Crisis Communication Theory (Coombs, 2007), as making the recommended apology along with compensation, although so far only to U.S. car owners. Many European car owners are still waiting for their cars to be recalled, and uncertain about compensation. While Volkswagen was active in its communications, this was only after the case had become public. Moreover, the company focused mainly on its own websites, posting relatively few replies in social media. This may partially explain the many negative sentiments expressed in the online environment. Moreover, it should be noted that the Volkswagen emissions issue has not yet fully been resolved.

At the shareholder meeting on June 22nd, 2016, heated discussions took place on the future of the company, one potential future direction being an increase in the production of electric vehicles. On that same day, ChinaBootik tweeted "Volkswagen places question mark over future of diesel technology via /r/Futurology https://t.co/sKL6K5vMWD" and, for example, ZackaryCox65 tweeted "Volkswagen to launch more electric cars after diesel scandal - https://t.co/sCSErWq844". Therefore, the case studied here, in fact, continues to live on, as does the broader issue of vehicle emissions in relation to the future of the car industry.

This study compiled and investigated a large amount a data to clarify social media debate on a CSR challenge. Although the volume of data was large, a limitation is that the study focused mostly on just one social media tool, Twitter. It has been suggested that different types of social media can function as different sub-arenas (Coombs & Holladay, 2014). However, additional data obtained from Facebook supported the conclusions based on the Twitter data.

The present analyses provide an overview of this heavily debated issue, showing how the crisis evolved over time, and providing insights into the sentiments expressed, the most active actors, and replies by the focal company. Future research could further analyze other cases where CSR challenges became a crisis, as this type of crisis has the potential to go viral, creating high sentiment scores and engaging a diversity of stakeholder groups.

Taken together, the case findings illustrate that CSR may become a risk if organizations are not able to fulfil their promises (Coombs & Holladay, 2015). The findings are also a reminder of the vast numbers of messages that are exchanged in such cases, as nowadays social media function as platforms for the co-creation of discourse by multiple actors on issues that they have a stake in. Monitoring such issues and responding to stakeholder needs and views is challenging. CSR challenges form an issue arena with complex multi-stakeholder interaction. It can be concluded that communication strategies need to take into account different types of crisis and organizational contexts, including CSR challenges. Moreover, on the topic of CSR challenges, CSR scholars may learn from insights provided by crisis communication scholars, and vice versa.

Acknowledgements

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Study V, Paper 7

VOLKSWAGEN EMISSION CRISIS - MANAGING STAKEHOLDER RELATIONS ON THE WEB

By

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