Managing Systemic Risks: Opening up Public Crisis Management in Global Networks

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Abstract. The more complex the interdependencies within global networks become, the more challenging it becomes to manage overarching crises with cascade effects. The organisations involved in crisis management are independent but must act collaboratively. This challenge affects both private and public organisations. The increase of autonomy and self-organisation seems to be an appropriate way to meet these challenges. However, disaster control is strongly based on hierarchical management structures. This paper shows design options and fields of action for collaborative and post-bureaucratic crisis management in global networks and, on this basis, describes the state of research and research gaps. Particular attention is paid to the state of empirical research. Building on this, the paper presents a first research framework for collaborative and post-bureaucratic crisis management in global networks. The level of openness and the combination of hierarchical and collaborative elements in crisis management are taken into account.

Keywords: Public Crisis Management, Global Networks, Collaboration.

1 Introduction

The more complex the interdependencies between social and economic systems worldwide become, the more challenging it becomes to manage difficult to assess overarching crises with cascade effects. This challenge affects both private and public organisations.

Administrations as control systems cope with an increasing environmental complexity by mapping this complexity in their internal structures, resulting in highly specialised, finely structured administrations [1]. The effective and efficient control of a differentiated and heterogeneous administrative system becomes more and more difficult with increasing specialisation. This applies in particular to crisis management. Against the background of global networks, crisis management must operate across national borders. This also affects private companies which also have to orient their crisis management across national borders.

From an administrative and organisational science perspective more autonomy and self-organisation are increasingly in demand (cf. inter alia [2] and [3]) in order to remain efficient despite growing environmental and system complexity. This can also be

transferred to public crisis management. Developments in information technology enable open organisations, i.e. the integration of external actors in government and administrative processes and thus also in public crisis management (cf. [4]). The lines between governmental and non-governmental crisis management activities are blurring [5].

However, crisis management is strongly hierarchical, also with a view to following military organisational principles. The combination of bureaucratic and post-bureaucratic elements and the simultaneous opening up to external actors could therefore be a suitable way of coping with crises in global networks. Highly professional external organisations and actors can then contribute to overcoming crises that affect them directly or potentially through cascade effects.

On the basis of governance paradigms (section 2), this paper derives design options and fields of action for collaborative and post-bureaucratic crisis management in global networks and, on this basis, describes the state of research and research gaps (section 3). Particular attention is paid to the state of empirical research. Building on this, the paper presents a first research framework for collaborative and post-bureaucratic crisis management in global networks (section 4). The paper ends with an outlook (section 5).

2   From Bureaucracy to New Public Governance

Public administrations are exposed to and shaped by specific paradigms and concepts. The traditional one is Public Administration according to Max Weber where the governance mechanism is based in particular on hierarchy. The following are, first, New Public Management basing on the adaption of private sector management and, second, New Public Governance (NPG), positing a plural state, where multiple interdependent actors contribute to the delivery of public services and thus focuses on self-organisation and inter-organisational relationships [6].

NPG largely meets the requirements of global crisis management in a highly interdependent environment. However, the role of digital transformation is not sufficiently taken into account. This aspect leads to the Open Government concept. There are some conceptual and terminological overlaps, but Open Government explicitly includes the extensive use of information systems. Open Government acts as an umbrella term for various concepts of openness focussing on transparency, participation, and collaboration of the state toward third actors in the economy or the citizenship [7]. Open Government is partly dominated by the idea of extending democracy in order to increase the integration of citizens, while others emphasise the increase in problem-solving capacity through the integration of external actors in general (citizens, business and non-profit organisations). The second view is particularly appropriate for this paper.

Partnerships and collaboration are ways to pool efforts to deliver services or to respond to crises; both require an appropriate governance [8]. From a system perspective, governance is shaped by the following design factors, which can be very differently formed [8]:
- Hierarchy, Market, Network

- Degree of centralisation
- Resource allocation
- Decision making
- Checks and balances

Systemic governance covers the public (sub-national, national and supranational level) and private sector (private companies, NGO, citizen organisations, citizens) [8]. The question is how these design factors can be arranged in such a way that the balance between hierarchy and self-organisation leads to successful global crisis management.

3 Collaboration in Crisis Management

The organisations involved in crisis or disaster management are independent but must act collaboratively [9]. This applies not only to response itself, but also to the other phases of disaster management, i.e. mitigation, preparedness and recovery [5]. Disaster management is a cyclical and collaborative process in which the collection, organisation and dissemination of information and data are critical [10]. Depending on the situation, different organisations are involved, including the disaster control authorities (in some cases on different federal levels), the fire brigades, the police, specialised authorities (e.g. environmental authorities), private aid organisations (e.g. the Red Cross), military forces, affected companies (in some cases critical infrastructures) as well as companies supporting certain services (e.g. transport). There are variations from one state to another.

Regarding section 2, decision making is a central focus of research on collaborative disaster management. Joint decision making requires the exchange of information and is therefore based on information flows. Sagun et al. distinguish four channels of information flow during a disaster [11]:

- within each participating organisation
- between organisations
- from people to organisations
- from organisations to people

With regard to tools and techniques that could improve and support decision-making in emergency situations, the literature generally focuses on training, decision support systems and simulation [12]. The use of crisis management systems can improve communication and support cooperation [13]. A plethora of information systems has been utilised in disaster management to facilitate collaboration among the organisations involved. Empirical research on this is rather rare, especially in the context of collaborative networks in disaster management [14].

Beyond that, the extent of hierarchical and self organised governance elements is also the subject of some studies. Traditionally, disaster management is characterised by hierarchy and centralisation. The shift to more decentralised disaster management systems was especially encouraged by the need to collaborate during and after extreme events [12]. This does not mean that hierarchical bureaucracy is completely replaced. It can still be found in "the mosaic that is contemporary emergency management" [5].

On one hand, emergency response requires careful organisation and planning, on the other hand, emergency management has to be highly adaptable [5].

Self-organisation within collaboration needs distributed decision-making, which can be very time-consuming. In addition, distributed decision-making makes it difficult to coordinate all information and provide situational awareness [12]. Participation is limited in large disaster management operations. Decisions must be taken quickly despite the large number of actors involved [5].

The question is how consensus-based decisions can be efficiently produced in self-organised groups and to what extent hierarchical elements can be meaningfully integrated. Janssen et al. ask whether hierarchical and peer-to-peer coordination structures are fundamentally incompatible or whether they can be combined and, if so, to what extent they can be combined [15]. They mention the need for ensuring adaptability, empowerment of teams and decentralised decision-making, as the local actors are best able to assess the situation.

Overall, there are only a few empirical studies on designing collaborative disaster management and its governance. Based on a case study in the UK, Kapucu and Garayev identify the following problems in collaborative disaster management: poor communication and interoperability, miscommunications, lack of coordination among organisations and deployed personnel, and the amount of time required to deploy common resources [12]. Waugh and Streib explore whether command and control systems are appropriate in dealing with catastrophic disasters in which authority is shared, responsibility is dispersed, resources are scattered, and collaborative processes are essential [5]. They argue based on the problems in disaster management during Hurricane Katrina in 2005 and stress the need for interpersonal contact and working relationships. This in turn places special demands on information systems, which must be able to facilitate and map these relationships effectively. There are also studies that look at the structure and development of formal and informal networks in disaster management (for an overview see [16]). However, the governance design and the role of information systems is largely neglected in this context.

The lack of empirical evidence to investigate and compare the impact and success of specific combinations of different governance elements (in particular hierarchical vs. self-organised) is problematic. The requirements for information systems in disaster management are very high (information aggregation, reliability). In the collaborative environment and for the achievement of consensus decisions they become even higher and in particular concern information synchronisation and visualisation as well as communication and coordination. Here, too, further research is needed, especially on the effects on disaster management output and outcome. The focus is often also on various governmental actors or aid organisations as well as volunteers. Companies are less considered in research on collaborative disaster management. Another problem is that the objectives of the different actors are often contradictory and the search for common ground can be a challenge.

4 Research Framework

The research framework results from the previously presented basics on collaborative crisis management in the context of New Public Governance and against the background of the extensive use of information systems. Since this paper reflects the status of an ongoing study, the research framework in Figure 1 is to be considered as preliminary. The framework is oriented towards the phases of crisis management.
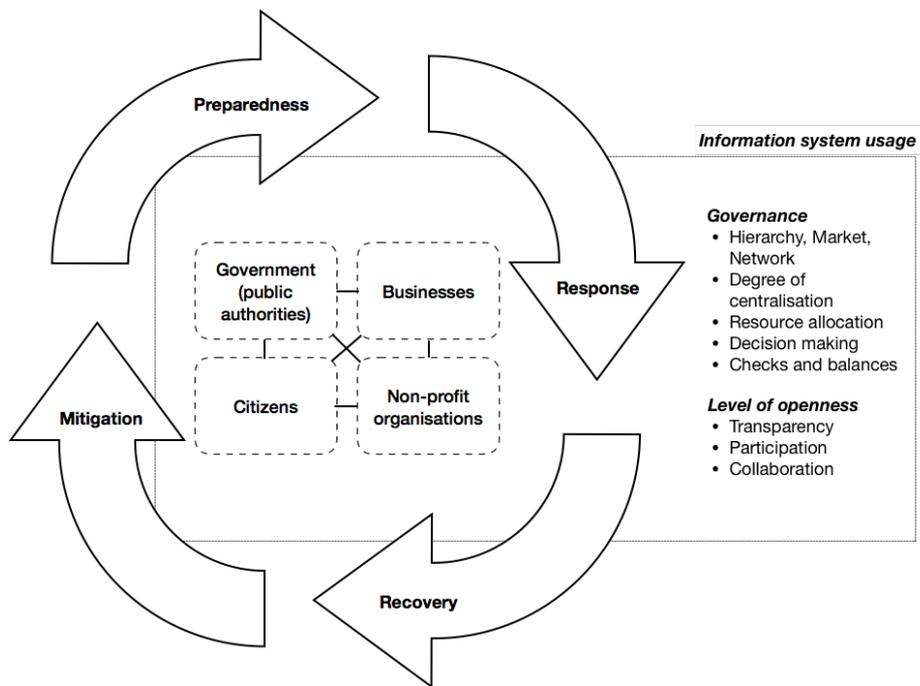
Fig. 1. Research framework for public crisis management in global networks

The level of openness describes the extent to which external actors are involved in terms of transparency, participation and collaboration (from the perspective of the individual actor). The level of openness can be different for the several external actors. For example, a distinction can be made between state actors, non-profit organisations, companies in general, companies operating critical infrastructures and citizens.

Furthermore, the governance of collaboration in global crisis management can be structured in different ways. To this end, the various shaping factors for governance must be considered. Of interest is the concrete application of hierarchical and self-organised elements for specific tasks in crisis management involving various actors. A problem is certainly that the level of openness and the design of governance overlap. This concerns, for example, resource allocation (information as resource, relevant for transparency) and decision making (relevant for participation and collaboration).

Also of great relevance is the question of the extent to which information systems cover the specific tasks in crisis management and the collaboration of the actors.

With regard to specific research activities, a general distinction can be made between theoretical or conceptual studies on the basis of the various disciplines and empirical studies with the focus on the impact on crisis management outcome. Empirical evidence of the impact on effective crisis management is particularly valuable here, as few results are available so far.

5   Outlook

The results presented here should be further differentiated and substantiated by a systematic literature search that takes into account the various disciplines in the field of crisis management. However, the preliminary results emphasise the great need for interdisciplinary and empirical research on global crisis management. In order to achieve rapid progress in empirical research, studies on the impact of different governance models (including the use of information systems) on the effectiveness of crisis management are of great importance. Comparative studies and experiments are suitable here. The research framework can help academics to classify their own research and identify new research questions. To further develop the research agenda, it is worth taking a look at similar work on other research topics in business informatics (e.g. [17] and [18]).

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