When does the phoenix rise? Factors and mechanisms that influence crisis-induced learning by public organizations

Broekema, W.G.

CHAPTER 4

The role of external experts in crisis situations: a research synthesis of 114 post-crisis evaluation reports in the Netherlands

This chapter is co-authored with Carola van Eijk and René Torenvlied and has been published as: Broekema, W., Van Eijk, C., Torenvlied, R. (2018). The role of external experts in crisis situations: a research synthesis of 114 post-crisis evaluation reports in the Netherlands. *International Journal of Disaster Risk Reduction*, 31: pp. 20-29.

4.1 ABSTRACT

This explorative study examines the role of external experts in crisis situations and the conditions under which their involvement contributes to adequate crisis management. Existing crisis management research tends to focus on stakeholder analysis, and the valuable input of experts during crisis *preparation*. Consequently, the role of external experts during the crisis response phase has been largely overlooked. This is somewhat surprising given the crucial role that is often attributed to external experts. To fill this gap, we have investigated the role of external experts by conducting a research synthesis of 114 post-crisis evaluation reports relating to 60 crises in the Netherlands between 2000 and 2013. The analysis shows that external experts are frequently involved and often play prominent roles in the crisis response. These external experts are often not actively recruited by the (strategic) crisis management response structure. In addition, the contributions and activities of external experts tend to be scarcely coordinated by the (strategic) crisis management response structure. Based on an in-depth analysis of the evaluation reports, we identify six opportunities and threats related to expert involvement in crisis situations, and ten conditions under which expert involvement contributes to adequate crisis management.

4.2 INTRODUCTION

On August 20th, 2002, a leak was discovered in a tank wagon, containing the hazardous and toxic acrylonitrile, that was part of a goods train temporarily halted at the busy central railway station in the city of Amersfoort in the Netherlands. Due to the risk of a possible explosion and potential health problems, the event quickly turned into a crisis situation with extensive media coverage. In line with the crisis-response plan the local crisis management response structure was activated, involving public officials and emergency services, which closed nearby roads and railways. There was great uncertainty as a result of a lack of knowledge of the cause of the leak, the chemical substances involved, and the potential consequences. In order to be able to adequately assess the situation and determine appropriate courses of action, the crisis management organization involved three external experts to provide advice: the chemical company DSM, and two railway companies NedTrain and Railion. Based on their expertise, the situation was classified as safe and the train shunted to a safe area, thereby putting an immediate end to the crisis. The official crisis evaluation report concluded that the external expertise brought in had strongly contributed to effective crisis management. The report recommended that the involvement of external experts was essential in preventing incidents with hazardous materials in rail transport (Geveke *et al.*, 2002).

In last decade, in crisis management research there has been a growing interest in the more immediate crisis response phase (Pan *et al.*, 2012; Coombs, 2006). Research shows that modern crisis management has a strong networking component: a large number and variety of actors collaborate to accomplish highly complex tasks while under time pressure (Pramanik *et al.*, 2015; Stephens *et al.*, 2005). Yet, although many studies analyze network collaboration among actors during a crisis (e.g. Comfort and Kapucu, 2006; Kapucu, 2006; Moynihan, 2008; Waugh and Streib, 2006; Drabek and McIntire, 2002), little attention is paid to the role of *external* experts in bringing and transferring expertise to these networks. To our knowledge, there is no systematic empirical study on external experts in crisis response situations (Van Eijk *et al.*, 2013).

The use of expertise is seen as crucial for organizing an adequate crisis response (Rosenthal and 't Hart, 1991; Grönvall, 2001; Baekkeskov and Rubin, 2014; Baekkeskov, 2016). The complexity of a crisis, which results from time constraints, a lack of reliable information, large uncertainty, and political pressures, together with the potentially dramatic consequences of inadequate decisions (Boin *et al.*, 2005), creates an immediate demand for expertise (Weick and Sutcliffe, 2015; Grönvall, 2001; Rosenthal and 't Hart, 1991). If sufficient expertise is not available in the (strategic) crisis management response structure, it should be drawn from elsewhere: from external experts. What, then, are the roles that external experts fill in real-life crisis situations? They could provide specialized knowledge to inform crisis

decision-making. They might bring in specialized skills needed to execute highly complex tasks. Their reputation may legitimize decisions and, hence, avoid potential blame games in the aftermath. At the same time, the involvement of external experts might result in a decrease in the unity of control and decisiveness. External experts might also bring in private interests, thereby jeopardizing the legitimacy of the crisis management.

In this explorative study, we provide initial systematic insights into these questions. Our central research question is: *What role do external experts play in crisis situations and under what conditions does their involvement contribute to adequate crisis management as reported in evaluation reports?* We explore the nature of external experts; how, and how often, they are involved; their roles in the crisis response; and the consequences of their involvement. We predominantly address the research question empirically, and produce a research synthesis of 114 evaluation reports that were published concerning 60 crises that took place in the Netherlands between 2000 and 2013. Drawing on all these reports enables us to systematically analyze a large amount of empirical data from a large number of crises while, at the same time, taking account of the specific crisis contexts. This is an innovative approach that adds value to the field of crisis management, which has been dominated by conceptual studies and single case studies (Veil, 2011; Smith and Elliott, 2007). Each of the evaluation reports included has been published by a recognized evaluation organization and based upon an in-depth investigation of a single crisis. Our study consisted of two parts. In the first, we coded the reports in terms of the experts involved and their characteristics, thereby providing an overview of the involvement of external experts in crisis situations. In the second part, we coded the statements in the reports that address the relationship between expert involvement and reported adequacy of crisis management. Based on this, we were able to identify six main threats and opportunities linked to expert involvement, and ten conditions under which expert involvement contributes to adequate crisis management.

4.3 THEORETICAL BACKGROUND

A crisis is seen as a situation in which the vital interests of a society are abruptly threatened with potentially dramatic physical, economic, and/or social consequences (Rosenthal *et al.*, 2001). When a crisis occurs, decision-makers in charge of the crisis management organization must make decisions under very complicated circumstances, and ones with potentially far-reaching consequences for society (Boin and 't Hart, 2003; Boin *et al.*, 2005; Sayegh *et al.*, 2004). Typically, a crisis situation involves uncertainty about what happened, its causes, and what might happen next (Rosenthal *et al.*, 2001). Since crisis situations are rare, and often hit unexpectedly, they are difficult to prepare for. Decision-makers often face a crisis while lacking previous relevant experience, and typically lack reliable information. The information available is often blurred by streams of biased and subjective input (Dekker

and Hansén, 2004). Despite all this, decision-makers are expected to provide meaning and sense to the event. Add in the potential for politicization (Broekema, 2016) and blame games (Boin *et al.*, 2005), and it soon becomes clear that a thorough assessment of alternative decisions and their consequences is limited (Gilpin and Murphy, 2008 Weisæth *et al.*, 2002).

Often, when a crisis occurs, a (strategic) crisis management response structure is activated, which typically consists of a cluster of 'regular' crisis management response organizations (see the section on the research design for a more detailed description of this structure in the Netherlands) and can be complemented with external actors relevant in the specific crisis context. The exact level of decision-making is likely to vary depending on the specific crisis and supposed impact. The 'internal' members of the (strategic) crisis management response structure may decide to involve 'external' experts to support decision-making and improve the adequacy of crisis management. In this study, we broadly define an *expert* as a person or organization that: (1) has specialized knowledge and/or skills in a particular field or area; (2) is considered to be an expert by the professional community or the broad public; and (3) has distinguished authority derived from their expertise (Mengis, 2007; Hoffman, 1998; Jasanoff, 1990; Ericsson *et al.*, 2006). The *external* element refers to whether or not actors are an integral part of the crisis management response structure; what actors are regularly (and sometimes formally) involved is often specified in crisis emergency plans and varies with the specific crisis.

The extensive experience in a certain domain external experts have, typically makes their judgements both highly accurate and reliable, and enable to deal effectively with unusual and 'tough' cases (Hoffman, 1998). Literature on emergency responses acknowledges the valuable input external experts potentially have (Perry and Lindell 2003); not only when it comes to providing solutions to solve the acute crisis but also to define the actual problem (Massey and Wallace 1996). This valuable input is even more prominent when *preparing* for a disaster or crisis: effective response strategies are key to control harmful effects of unforeseen disasters, and the effectiveness of these strategies partly depends on the quality of expert knowledge on which the response strategies are based (Mendonça *et al.*, 2008). Yet, studies in this brand of literature also show that strategic crisis response groups considerable vary in the aspects of and approaches to preparedness they actually emphasize, and that preparedness activities are fragmented across different organizations and sectors (Tierney *et al.*, 2001: 47-48).

Although incorporating expert knowledge might be valuable, it might also be challenging. The frontline response teams know how to perform domain-specific tasks (like firefighting and rescue) and are trained to coordinate these tasks (Chen *et al.*, 2008). When experts become involved, new coordination mechanisms might be required. In times of crisis, with increased time pressures and urgency, a fit between task requirements and personnel expertise, as well as a smooth functioning of task flows are even more crucial; making the

coordination issue even more prominent (Chen *et al.*, 2008). Eliciting expert knowledge is further complicated when experts (and the actors of the crisis management response structure) are geographically separated, and when expert knowledge is difficult to cohere (Mendonça *et al.*, 2008). In particular when multiple alternative perspectives are added to the crisis decision-making process, this can hinder an effective decision-making process (Massey and Wallace, 1996).

However, although valuable, these studies provide limited insight in what actors actually are involved as experts, and what role they have during the crisis. Moreover, as this body of literature is mainly (though not exclusively) concerned with how to prepare for a crisis, the main focus is on those actors that are involved in a more structural manner. Consequently, actors that are involved as expert in a more ad hoc manner during a particular crisis, are beyond the main scope of interest. Yet, we can assume that a (strategic) crisis management response structure in the 'heat of the moment' can also rely on experts on a more incidental basis. Rosenthal and 't Hart (1991) advise adopting an open stance regarding what are experts that become involved in crisis situations because these can cover a wide range of actors: "*Experts may be part of the bureaucracy or they may be outsiders asked for ad hoc advice. They may or may not be obliged to give detailed feedback to their constituency. They may have experience in giving advice in a crisis context or may be doing so for the first time*" (p. 352).

Crisis management literature furthermore report various roles taken on by experts in crisis management. Studies mention supporting decision-making (Baekkeskov, 2016; Rosenthal and 't Hart, 1991), reducing uncertainty (Grönvall, 2001; Rosenthal and 't Hart, 1991), and providing legitimacy (Grönvall, 2001; Baekkeskov and Rubin, 2014). The expertise input can be viewed as a process of learning during a crisis (Broekema *et al.*, 2017). Herek *et al.* (1987, p. 204) stress the important 'pieces of information' that experts can provide during a crisis. Some studies refer to particular policy fields that require inputs from external experts in crisis situations (Grönvall, 2001; Baekkeskov and Rubin, 2014).

However, many questions remain. Little is known about the background of external experts (public, non-profit/voluntary, semi-government, private, or academic). Moreover, it is not evident from the literature how external experts become involved in crisis management (Majchrzak *et al.*, 2007). Crisis management often has an informal, ad hoc networking character (Scholtens, 2008; Schraagen *et al.*, 2010). Little is known about the types of crisis and the typical crisis dynamics in which external experts become involved. Neither is it evident that expert involvement is always of useful value or without challenges (Chen *et al.*, 2008; Grönvall, 2001; Rosenthal and 't Hart, 1991). Experts may also have different views, which may threaten the adequacy and legitimacy of crisis management. Despite all this, the link between expert involvement and adequacy of crisis management has not been studied systematically and empirically.

Professional practice similarly provides little evidence. In the Netherlands, crisis handbooks and crisis-response plans generally provide very little guidance about collaborating with external experts (Scholtens, 2008). Some crisis-response plans, organized along functional chains, type of crisis, and policy domain, do mention a few potential external partners that the crisis organization might involve (e.g., Ten Dam, 2015). However, there is little or no reference to how to organize a collaborative process involving external parties and experts. As such, an explorative but comprehensive study is appropriate, and needed, to shed more light on the questions discussed above.

4.4 RESEARCH DESIGN

The empirical context for the present study is the Dutch crisis management system which is based upon consensus and cooperation between different layers of government. Local governments (provinces and municipalities) have delegated authority and independence, while central government can impose certain tasks upon them. The Dutch crisis management response system consists of a 'regular' temporary crisis management response structure, including national crisis management bodies, inter-municipal 'safety regions', and municipalities, possibly complemented by (a variety of) external actors, depending on the specific crisis context (NCTV, 2013; Torenvlied *et al.*, 2015). When a crisis occurs in a municipality, often the local executive (the board of mayor and aldermen) has prime responsibility for organizing the response. For dealing with transboundary and complex incidents, twenty-five safety regions have been defined. Their executives are responsible for coordinating collaboration between municipalities, fire departments, the police, and medical assistance at the regional level (Safety Regions Law, 2010). For the crisis response by organizations at the national level, the tasks, responsibilities, and guidelines are included in a national crisis decision-making handbook (NCTV, 2013).

We study the role of external experts in crisis situations through a 'research synthesis' using 114 post-crisis evaluation reports related to 60 crises that occurred in the Netherlands between 2000 and 2013. A research synthesis systematically reveals, from secondary sources, general patterns in infrequent events that are complex in nature (Cooper *et al.*, 2009). Syntheses of evaluations provide better generalizable insights compared to single case studies (Mayne and Rist, 2006). Post-crisis evaluation reports are a rich source of information on crisis management since these reports are based on in-depth investigations by a team of professional and formally independent experts[17] and aimed at learning lessons

17 We do acknowledge that also evaluation reports might be (politically) 'colored', or might become part of a political debate. Yet, given the independent position of the research teams/institutes and the authority of many of these research teams/institutes, we can assume that these reports in itself are relatively non-politicized and are a reliable source of information.

after a crisis (Moynihan, 2009; Elliott, 2009). By taking context into account, lessons from one report can usefully inform later crisis responses (Crichton *et al.*, 2009).

4.4.1 Inclusion criteria

Given that there is no comprehensive list of crises in the Netherlands, we aimed to create this list of crises by integrating databases from several crisis management authorities and institutes: the Dutch National Crisis Centre ('NCC'), the Dutch Association of Mayors ('NGB'), the Dutch Safety Board, the Inspectorate of Security and Justice, COT Institute for Safety and Crisis Management, Safety Region Authorities, and the Dutch Safety Council ('Veiligheidsberaad').

In this, we applied several inclusion criteria. We selected the year 2000 as a starting year. This year was chosen because it saw the introduction of major reorganizations to the Dutch crisis management system that define the current practice and procedure for how crises are evaluated. We selected 2012 as the last year for inclusion because that was the year in which we started data collection. We excluded purely political or financial-economic crises because of their distinct nature. On the further condition that evaluation reports were available, a list of 58 crises was derived. Subsequently, we discussed this list extensively with a panel of ten Dutch crisis management experts (researchers and practitioners). This resulted in the inclusion of eight further crises and the exclusion of six of the original based on the criterion of having a substantial impact on vital societal interests. Table 4.1 lists the resulting 60 crises (most recent first).

For each of the 60 crises, we retrieved all the relevant evaluation reports published by recognized, authoritative evaluation organizations. In this process, we identified a total of 114 post-crisis evaluation reports and identified 131 times an evaluation organization was involved in these 114 evaluations. Note that some crises were evaluated by more than one organization and that some reports were published by more than one organization. Evaluations were carried out by the Dutch Safety Board ('OvV') ($n = 14$), ad hoc commissions ($n = 13$), the Inspectorate of Security and Justice or its predecessor ('IVenJ'/'IOOV') ($n = 13$), other functional government inspection agencies ($n = 20$), such as the Health Care Inspectorate ('IGZ'), COT Institute for Safety and Crisis Management ($n = 17$), other consultancy firms ($n = 16$), municipalities ($n = 7$), safety regions ($n = 5$), and others ($n = 26$), which consist of expert institutes in a specific area, such as the Institute for Safety ('IFV') or the Dutch National Institute for Public Health and the Environment ('RIVM'), and 'traditional' crisis management organizations, such as water boards ['waterschappen'], the police, or fire departments.

Table 4.1 Research population of crises that took place in the Netherlands between 2000 and 2013

Year	Date*	Crisis
2000	00/05/13	Explosion fireworks warehouse, Enschede
	00/12/16	Den Bosch riots
2001	01/01/01	Café fire 't Hemeltje, Volendam
	01/03/21	Foot-and-mouth disease outbreak
	01/05/07	Fire entertainment center De Bonte Wever
2002	02/05/06	Assassination Pim Fortuyn
	02/07/12	House fire, Roermond
	02/08/20	Fuel wagon leak Amersfoort train station
2003	03/02/28	Avian Influenza outbreak
	03/03/23	Fire King's Church, Haarlem
	03/08/26	Dike inundation, Wilnis
	03/09/28	Scaffolding collapse Amercentrale power station
2004	04/11/02	Assassination Theo van Gogh
	04/11/13	Mosque fire, Helden
2005	05/09/20	Grounding Fowairet container ship, Westerschelde
	05/09/28	High mortality Radboud hospital
	05/10/27	Fire detention center Schiphol
	05/11/25	Power outage, Haaksbergen
2006	06/05/06	Oranjefeesten riots, Pijnacker
	06/09/28	Fire operating room Twenteborg hospital
	06/11/21	Emergency landing helicopter, North Sea
2007	07/01/30	Ship fire, Velsen
	07/04/04	Release and spread of white substance, Spijkenisse
	07/06/13	Q fever disease outbreak
	07/09/17	Drinking water supply failure, Noord-Holland
	07/10/22	Fire Armando Museum, Amersfoort
	07/11/05	Acute health problems pet store, Hoogeveen
	07/11/12	Senseless violence, Lottum
	07/12/12	Power outage, Apache helicopter crash, Bommeler- en Tielerwaard
2008	08/01/13	Asbestos fire, Vroomshoop

Year	Date*	Crisis
	08/02/14	Crash emergency vessel, Ooij
	08/05/09	Fire shipyard, De Punt
	08/05/13	Fire Delft University of Technology
	08/07/07	Explosion bunker, Bilthoven
	08/12/24	Stabbing incidents Jack de Prikker
2009	09/02/09	Death threats schools, Weesp
	09/02/25	Plane crash Turkish Airlines
	09/04/15	Stomach surgery Scheper hospital
	09/04/24	Mexican flu pandemic
	09/04/30	Assault Queen's day, Apeldoorn
	09/06/08	Den Bosch sex crimes case swim teacher
	09/08/22	Hoek van Holland beach riots
2010	10/03/08	Fire fighter casualty, Veendam
	10/07/02	Wildfire Strabrecht's Heath
	10/12/07	Day-care sex crimes case, Amsterdam
2011	11/01/05	Fire chemical firm Chemie-Pack Moerdijk
	11/03/12	Fire GGZ healthcare facility Rivierduinen
	11/04/09	Shooting Alphen aan den Rijn shopping mall
	11/05/31	Klebsiella outbreak Maasstad hospital
	11/07/07	Roof collapse Grolsch Veste stadium
	11/07/27	Breakdown KPN network Waalhaven
	11/09/02	Diginotar cyber security hack
	11/09/17	Riots Maasgebouw
	11/11/07	Natrium fire, Farmsum
	11/12/02	Sinking of 't Loon shopping mall, Heerlen
2012	12/01/02	High water Groningen
	12/01/04	High water Friesland
	12/04/21	Westerpark train accident
	12/07/22	Asbestos discovery Kanaleneiland
	12/09/21	Project-X Facebook riots Haren

* Date refers to the incident(s) that initiated the crisis.

4.4.2 Operationalization and coding

The research synthesis consists of an in-depth analysis of each of these 114 reports. This study addresses the crisis response stage only (Coombs, 2014; Veil, 2011), a period which we found was usually discussed in a distinct section of a report. In nine reports, this was not the case, and here we determined the crisis response stage on the basis of the time period that the temporary crisis management structure was activated. We found that crisis evaluation reports are generally organized in a similar way. We read the summary and introduction of every report, and the sections that addressed the crisis response stage, the analysis, conclusions, and recommendations, and also scanned the parts on preparation and the aftermath to gain a fuller impression of the context of the crisis. In checking and supplementing the coding, we systematically searched for thirteen terms to identify the involvement of external experts such as: 'expert', 'knowledge', and 'external'.

We assumed an expert was external if it was not part of the 'regular' (strategic) crisis management response structure (in Dutch: *reguliere crisisbeheersingsorganisatie*). The 'regular' (strategic) crisis management response structure in the Netherlands is described in the National Crisis Decision-Making Handbook and consists of a cluster of organizations (NCTV, 2013; Torenvlied *et al.*, 2015). This structure includes temporary crisis management bodies, such as a Ministerial Crisis Management Committee ('MCCb'), an Interdepartmental Crisis Management Committee ('ICCb'), and a National Communication Team ('NKC'), and (activated parts of) permanent crisis management bodies, such as the National Crisis Centre ('NCC'), responsible ministries, safety regions, and local governments.

To answer our research question, we explored the role and impact of external experts in the adequacy of crisis management in two ways. In part I, we used a standardized coding scheme to develop an overall picture of the involvement of external experts. In part II, we integrated the specific crisis contexts through an in-depth analysis of the evaluation reports, as we recognized that the context can have a strong explanatory value in itself (Johns, 2006; Pierce and Aguinis, 2013). We coded individual statements in the reports that explicitly link the specific role of experts involved in a crisis to the reported adequacy of management of that crisis.

Part I

We used a standardized coding scheme to code characteristics in the reports on two levels of analysis: (a) the level of external experts and (b) the level of crises (see Table 4.2). The coding scheme classifications were developed based on preliminary research: a pre-study of ten crises and ten in-depth interviews with crisis management experts. In coding the 114 evaluation reports, we identified 302 external experts who were involved on 436 occasions

in the 60 crises. Some of these experts were thus involved in multiple crises. As such, $n = 302$ for variables measuring external expert characteristics, $n = 60$ for variables measuring crisis characteristics, and $n = 436$ for variables measuring crisis-expert relational characteristics. The coding process was carried out by two researchers independently, and the average inter-coder reliability was 85 percent. After discussing differences, the two researchers agreed final codes.

After identifying the external experts, we coded them based on the five characteristics that we were interested in. First, for the *background* of the expert, we used five categories: public, non-profit / voluntary, semi-government, private, and academic. For the *initiative for involvement*, we established three categories: crisis organization, other expert, and own initiative. For the *moment of connection* characteristic, we had two categories that were intended to tap the ad hoc versus pre-crisis established nature of the relationship with the external expert. The *reason for involvement* characteristic aimed to capture the primary relevance of the external expert for the crisis response. Here, we differ between four categories, including independent expertise and proximity to the crisis location. Finally, the *term of involvement* characteristic aimed to capture the duration of the expert's involvement with the crisis management organization, which can be either on (an) occasional moment(s), for a longer period of time; or during the largest part of the crisis.

Table 4.2 Coding scheme for characteristics of expert involvement and crisis

Level	Characteristic	Categories
Expert	Background of expert	Public sector; non-profit / voluntary; semi-government; private sector; academic
	Initiative for involvement	Involved by crisis management organization; involved by other expert; on own initiative
	Moment of connection	Expert already present in network; became involved during crisis
	Reason for involvement	Material threat to existence; threat to task performance; proximity to crisis location; specific knowledge
	Term of involvement	Occasional; longer period(s); structural
Crisis	Number of external experts	[number]
	Type of crisis	Natural; traffic and transport; infrastructural; public services; public health; veterinary crises; technological crises; public order; terrorism; foreign
	Crisis dynamic	Fast-burning; average; slow-burning

When it came to coding the crises, we included the *number* of external experts as a simple count variable by totaling the number involved in each crisis. Two characteristics, *type of crisis* and *crisis dynamic*, were determined using existing categories as a basis (Muller *et al.*, 2009; Rosenthal *et al.*, 2001).

Part II

In order to obtain a better understanding of the relationship between expert involvement and adequacy of crisis management, in part II we qualitatively checked the evaluation reports on reported aspects of adequacy of crisis management. We coded statements in the reports that explicitly refer to a relationship between the involvement of an expert and adequate crisis management processes. Given that an aim of the evaluation reports was to assess the crisis management process, such qualitative judgements and interpretations were generally clear and explicit. For example, the report after the *2007 petstore crisis in Hoogeveen* concluded: *"If a liasion of the RIVM were included in the Regionaal Operationeel Team [crisis management response structure] at the time the RIVM was at the incident location, the information provision [...] would have been more effective"* (Bos *et al.*, 2008b, p. 39). We uncritically accepted the conclusions in the evaluation reports rather than making our own judgements on what was 'adequately managed' or not.

After carefully analyzing all the statements, the two researchers separately grouped the statements to create recurring themes. After comparison and discussing their groupings, this resulted in 27 themes, such as 'involving experts to provide a second opinion' and 'the maintenance of an expert network in non-crisis times'. Some of the themes turned out to be closely related, or to have quite similar meanings, such as 'as a second opinion' and 'consulting crisis managers that have experienced similar crisis events in the past'. Given this situation, we further grouped these 27 themes to provide a final list of six main opportunities and threats linked to expert involvement, and ten conditions under which expert involvement contributes to reported adequate crisis management.

4.5 RESULTS

4.5.1 Part I – The role of external experts in Dutch crisis situations

Background of experts and frequency of involvement

Frequency of involvement. The data show that external experts are frequently involved in crisis response activities. In 56 of the 60 crises, we identified the presence of at least one external expert. There is little restraint on involving experts: on average almost seven experts were involved in each crisis. In 40 percent of the crises, fewer than five external experts were involved; in 10 percent of the crises 15 experts or more. There is also a striking variation

in their involvement between crisis types and crisis dynamics. For example, a total of one hundred external experts were involved in the three veterinary crises in our dataset. One possible explanation is that this is due to the slow-burn nature of these crises combined with the strong need for specialized technical knowledge and skills. Of all the external experts in our dataset, 90 percent were organizations rather than natural persons.

Background of expert. Table 4.3 provides the backgrounds of the experts and the types of crisis they were involved in. The specific context of a crisis determines which experts are 'internal' and which are 'external' to the (strategic) crisis management response structure (as explained in the research design). For example, in the *2010 Strabrecht's heath wildfire,* the affected municipality viewed the Ministry of Defense as an external actor, due to their irregular contact in normal times. Similarly, the German fire brigade involved in the crisis response to the *2000 fireworks factory explosion in the city of Enschede* was perceived as external. Clearly, external experts are a heterogeneous group of actors including people acting on their own (such as an individual explosives expert), private companies (Microsoft), non-profit healthcare organizations (Red Cross), academic institutions (Architecture Department at Delft University of Technology), semi-public organizations (Institute for Applied Science ('TNO'), and public organizations (Department of Waterways ('Rijkswaterstaat')).

Table 4.3 Public-private background of external experts per type of crisis

	Background of expert					
Type of crisis	**Public sector**	**Non-profit / voluntary**	**Government controlled company**	**Private company**	**Science**	**Total**
Natural	16	7	0	12	3	38
Traffic and transport	21	8	4	15	1	49
Infrastructure	20	24	2	25	3	74
Utility services	6	1	3	14	0	24
Public health	24	24	9	20	7	84
Veterinary	20	51	0	14	15	100
Technological	5	1	0	2	0	8
Public order	10	12	1	5	2	30
Terrorism	2	3	0	0	0	5
Total	124	131	19	107	31	412

Note: the backgrounds of 24 experts were not provided in the reports.

Predominantly, the external experts involved were either private companies (30 percent), non-profit / voluntary organizations (32 percent), or public sector organizations (26 percent). Examples are, respectively, Shell's fire brigade which became involved in the *2011 fire at the Chemie-Pack chemical industry at Moerdijk*; the Institute for Psychological Trauma (IVP) involved in the *2011 Alphen aan den Rijn shooting in a shopping mall*; and the Municipality of Amsterdam in the *2011 sinking of the 't Loon shopping mall*. Fewer than 8 percent of the experts were scientific organizations such as the Utrecht University Veterinary Science Department that was involved during the *2007 Q fever outbreak*. Table 4.3 shows how the background of the external experts varied by the type of crisis. Private sector experts were, for instance, relatively over-represented in infrastructure and utility services crises responses.

Why are external experts involved?

Initiative for involvement. In the majority of cases (60 percent), the crisis management response structure actively involved the external expert in its crisis response activities. Active recruiting of external experts might be in line with expectations. However, we found that in more than 25 percent of the cases, the experts took the initiative to become involved. For example, the energy consultancy company KEMA became involved, as it was already present on the *Amercentrale* energy plant site when *scaffolding collapsed within the power plant in 2003*. During the *2009 crash of Turkish Airlines flight 1951 at Schiphol Airport,* a traumatologist was by coincidence present and stepped in to help. A further 13 percent of the external expert involvement was as a result of being invited by another expert. For example, after the *2009 bunker explosion in Bilthoven,* the Dutch Labour Inspectorate engaged EOCKL and TNO who were specialists in the making safe of explosives.

Moment of connection. In 67 percent of the cases relations with the external experts were established ad hoc. This implies that most external experts were recruited by the crisis management response structure at a certain moment during the crisis response phase (for example as result of a search for specific knowledge needed in the crisis) or that an expert introduced itself. Only in a one-third minority of cases the experts were already present in the network of the crisis management structure and relations were established before the crisis occurred, for example as a result of preparations or as a result of collaboration during a previous crisis or crisis training.

Reason for involvement. On the basis of the mainstream crisis literature, one would expect the main motivation for involving external experts stems from their specialized 'technical' expertise and skills and, indeed, in many instances this was true. For example, when the *2003 Avian Influenza outbreak* was suspected, samples were sent to the Central Veterinary Institute ('CVI') in Lelystad for laboratory testing, which a day later confirmed that there was indeed an outbreak.

Although being a technical expert is a common reason for involvement, this only seemed to be the case in half of the crises we studied (see Table 4.4). Involvement of an expert can also be a consequence of proximity to the crisis location. For example, in the *2011 Chemie-Pack fire at Moerdijk,* Shell's private fire brigade provided direct assistance due to its proximity to the fire location. In 36 percent of the cases, experts are involved because of their tasks and responsibilities in such situations. For example, the Royal Netherlands Sea Rescue Institution ('KNRM') was logically involved in the search-and-rescue activities after the *2006 Emergency landing of a helicopter in the North Sea*. In 8 percent of the cases, involvement was the result of a direct material threat to the organization concerned. Organizations hit by a crisis seem often automatically to qualify as experts. For example, during the *2011 Natrium fire at a chemical plant in Farmsum*, the crisis management response structure quickly involved Dow Chemical, the plant owner, in its crisis team and at the press conference.

Table 4.4 Typology of external experts in crisis situations

Type of expert	Frequency	Primary reason for involvement
Technical expert	49%	Outstanding technical knowledge and/or skills
Proximity expert	7%	Proximity to crisis location; easy to connect to and quickly deployable
Task expert	36%	Responsibilities for accomplishing certain tasks
Threatened expert	8%	Expertise on processes in own organization threatened with material losses

Term of involvement. Finally, we saw that around half of the external experts were involved only occasionally during the crisis. For example, during the *2009 death threats at schools in the city of Weesp,* a specialized company was asked to provide camera images and make them appropriate for further investigation. Over a third of the external experts became involved over a longer period during the crisis response phase. For example, Foundation Juvans continued to provide mental healthcare after the immediate response to the *2009 exposure of long-term sexual abuse of children in a Den Bosch swimming pool*. Only 15 percent of the experts were involved on a structural basis, during the largest part of the crisis response, establishing a close cooperative relation with the (strategic) crisis management response structure. For example, the energy network operator Continuon became involved during the *2007 Power outage at Bommeler- en Tielerwaard* when an Apache helicopter crashed and hit several power lines.

4.5.2 Part II – Conditions under which expert involvement contributes to adequate crisis management

In order to integrate the specific crisis contexts, we carried out an in-depth analysis of the evaluation reports. This analysis resulted in the identification of six opportunities and threats and ten conditions under which expert involvement contributes to adequate crisis management.

Opportunities and threats in external expert involvement

The rich content and thick descriptions in the evaluation reports provide considerable information about factors that stimulate or impede the successful involvement of external experts in crisis responses. From the reports, we distilled three main opportunities and three main threats to adequate external expert involvement in responding to a crisis (Table 4.5).

Table 4.5 Main opportunities and threats of external expert involvement in crisis response

Opportunities	Threats
Knowledge acquisition	Loss of consensus and decisiveness
Use of operational skills	Loss of control
Increase of legitimacy	Interference of private interests

Opportunities: integrating knowledge, skills, and reputation

Knowledge acquisition. Typically, in times of crisis, reliable information is scarce. Expert knowledge can reduce uncertainty and chaos by providing sense and meaning to events. It enables a better assessment of the causes and consequences of an event, and may offer appropriate courses of action. Based on their previous experience and specialized knowledge, experts are able to recognize patterns quickly. Especially in technologically advanced domains, such as in ICT, chemistry, and transmittable diseases, the crisis management response structure needs to rely heavily on external experts. External experts not only provide general and highly specialized advice, but second opinions to evaluate the reliability of existing information. This role of the chemical company DSM and the NedTrain and Railion railway companies was demonstrated in the *2002 tank wagon leak at Amersfoort railway station* (Geveke *et al.*, 2002) discussed in the introduction.

Use of operational skills. Sometimes external experts' specialized operational skills enable them to carry out highly complex tasks where operational errors could have dramatic consequences. For example, in the *2001 foot-and-mouth outbreak* (in which around 270,000 cloven-hoofed animals were culled), the crisis management response structure collaborated with Rendac, a company specializing in animal disposal. Rendac carried out a variety of crisis response operations, such as retrieving animal carcasses from infected farms, destroying

the carcasses, and collecting manure and milk from the vaccinated areas. The report states that Rendac *"played a crucial role in the operational response"* (Abbas *et al.*, 2002, p. 179).

Increase of legitimacy. The crisis management response structure can use the reputation of external experts to build trust, integrating the expert's reputation into the organization's. Neutrality can be a crucial asset in the de-politicization of crises – especially when deployed in crisis communication. Engaging experts can bring broader societal values and interests into the crisis organization. For example, during the *2007 Q fever outbreak* (a highly contagious zoonotic disease found in goats), the crisis organization established an expert council which held periodic meetings with a broad range of experts (including, among others, animal health services 'GD Animal Health', the Public Health Services ('GGD'), the Dutch Federation of Agriculture and Horticulture ('LTO Nederland'), Utrecht University department of veterinary science, Centre for Infectious Disease Control ('CIb'), and the National Institute for Public Health and the Environment ('RIVM'). The function of this council was to provide the crisis organization with general advice, new strategies, and estimates of likely effects regarding their response to the Q fever outbreak. This consultation increased the legitimacy of the crisis response (Van Dijk *et al.*, 2010).

Threats: loss of consensus, control, and public values

Loss of consensus and decisiveness. Involving external experts often brings additional views and opinions to the table, which makes crisis management more complex. External experts may also make decision-making processes unclear because their role, and the formal status of their advice, is often undefined. Involving multiple experts also creates a risk of receiving contradictory expert advice. For example, in the *2005 grounding of the container ship Fowairet* (carrying hazardous substances) *in the Westerschelde estuary*, two external experts (RIVM, the National Institute for Public Health and the Environment, and DCMR, the joint environmental protection agency) were involved in calculating effect distances. Their conclusions, and also those of an internal study by the fire department, differed widely, and this complicated the decision-making process. The evaluation report concluded that there should always be either an unambiguous outcome of expert advice that is not susceptible to discussion, or a sound explanation for any differences (Hartman and Schweden, 2006).

Loss of control. By involving external experts, the crisis management response structure gives away a certain degree of autonomy and influence. An external expert may, for example, be provided with highly sensitive or classified information and yet, at the same time, use their own communicating channels to the media and involve their own network. Further, once consulted, it is often difficult for crisis managers to disregard an expert's advice. For example, in the *2011 Diginotar cyber security hack*, which posed a threat to the privacy of data of Dutch citizens and companies, the crisis organization closely collaborated with Microsoft. The crisis organization asked Microsoft not to implement a software update because this

would block the DigiNotar digital protection certificates. However, Microsoft implemented the update to emphasize its independent status. Microsoft also refused to collaborate with the (strategic) crisis management response structure on issuing a shared press report and released its own version of events (IVenJ, 2012).

Interference of private interests. The reports show that the private interests and private values of external experts are sometimes at odds with the interests of the (strategic) crisis management response structure. Private actors could themselves be viewed as stakeholders in the crisis and to some extent have their own agendas, which brings into question the democratic legitimacy and accountability of the crisis organization. For example, in the *2009 Mexican flu outbreak,* the crisis organization worked together with Professor Coutinho of the Centre for Infection Disease Prevention (CIb) and Professor (of virology) Osterhaus of Erasmus Medical Centre. These two 'super experts' played an important role in communications with the media, even acting as the 'public face' of the (strategic) crisis management response structure. The involvement of Professor Osterhaus became highly controversial and was criticized when his interests in the pharmaceutical industry were discovered by the media (Helsloot and Van Dorssen, 2011).

Conditions under which expert involvement contributes to adequate crisis management

The stimulating and impeding factors, described above, are sometimes two sides of the same coin. Sound crisis management needs to balance these factors. Based on the analyses above, and other statements in the evaluation reports, we were able to identify ten conditions which, if met, lead to expert involvement contributing to adequate crisis management.

Involve external experts only when actually needed. When a crisis breaks out, the crisis management organization should only involve external experts if the specialized knowledge and skills required are not sufficiently available within the organization itself. Working with experts that are part of the (strategic) crisis management response structure can reduce coordination problems. For example, in the *2011 mental healthcare facility fire at GGZ Rivierduinen,* the crisis organization decided to not involve any external experts on the grounds that it had *"sufficient housing capacity for calamities, both in terms of facilities and required expertise and treatment capacity. Rivierduinen itself plays a role in the psychosocial assistance during [regional] disasters"* (Zannoni *et al.*, 2011, p. 43).[18]

Maintain an expert network in non-crisis times. Maintaining a network of experts in non-crisis time facilitates effective collaboration when a crisis arises. Through pre-established personal contacts, joint training exercises, and simulations, the crisis organization gains a clearer view of the functional areas and crisis scenarios covered by the external expertise. For example, in reaction to the outbreak of the *2008 Vroomshoop asbestos fire*, collaboration

18 Since all evaluation reports are written in Dutch, all quotes are translated.

was initiated with two asbestos removal companies, Hein Heun and RPS. Both these experts were asked for advice on a possible evacuation. The evaluation report concludes that collaboration commenced late because *"the municipality and emergency services had an insufficient picture of the network of external partners that, in the event of an incident, could have a possible role"*, and that this resulted in late crisis response measures (Bos *et al*., 2008a, p. 3).

Be familiar with each other's roles and plans. If the crisis management response structure and the experts are familiar with each other's general and crisis-specific tasks and responsibilities, they will coordinate more effectively during a crisis. The availability of basic agreements and principles for the roles of external experts creates clarity and ensures that important expertise is not overlooked. At the same time, blueprints can leave insufficient room for flexibility, so an optimum needs to be found. In the *2006 emergency helicopter landing in the North Sea* the collaboration with the Royal Marines, the Coast Guard, and the Dutch Oil company was suboptimal because the actors were insufficiently aware of each other's roles and expectations, to an extent due to unclear plans. The report concludes that "*for good cooperation it is important that parties know each other, each other's interests, and each other's responsibilities, authorities, and tasks*" (Bos *et al*., 2007b, p. 57).

Employ clear and close communication lines. Communication lines between the crisis organization and external experts are often inadequate, resulting in suboptimal sharing of information. Communication lines should be short and direct, which could be achieved by appointing liaison officers in the (strategic) crisis management response structure and in the expert organizations. Often effective communication is achieved through face-to-face contact. For example, in the *2007 regional failure of the drinking water supply in Noord-Holland*, information exchange was fast because a liaison officer from the drinking water specialist PWN had been included in the crisis management team. Nevertheless, the report notes that the communication lines would have been still better if the roles of the liaison officer were clear (Bos *et al*., 2007a).

Define clear mutual expectations. From the reports, it is apparent that, for adequate crisis management, it is important that experts know what is expected of them in terms of their role and expertise. Several reports conclude that if expectations had been set more clearly at the start of the cooperation, crisis response activities would have been better performed. For example, in the *2007 pet store crisis in Hoogeveen* (people acquired acute health problems for unknown reasons), measurements were carried out by the environmental safety service 'MOD', the National Poisons Information Centre ('NVIC'), and Groningen University Medical Center ('UMCG'). The evaluation report concludes that collaboration with the external experts was inadequate, because of the unclear status of the advice from the various experts (how to 'weight/value' it) and therefore uncertainty over how this advice should be included in decision-making (Bos *et al*., 2008b).

Request specific information. Although there are cases where the crisis management response structure consults experts for general strategic advice, requesting specific technical information stimulates more effective collaboration. It reduces the probability of redundant, and sometimes contradictory, information and advice, and sets clear expectations. It emphasizes the autonomy of the crisis management response structure vis-à-vis the external expert. In addition, it enables better reflection on tasks in a later stage. For example, in the *2003 Wilnis dike inundation*, the crisis organization requested GEO Delft, a technical research institute, to test the silt for harmful substances. The next day, GEO Delft concluded that the silt was not contaminated, providing an adequate basis for appropriate decisions (Houben *et al*., 2004).

Consult crisis managers with experience; request second opinions. The reports show that seeking advice from crisis managers who had experienced a similar crisis proved very effective. For example, in the *2011 Alphen aan den Rijn shopping mall shooting* incident, the crisis management organization received advice on external communication with victims from officials involved in the response to the *2009 Queens Day assault* in Apeldoorn, which contributed to delivering adequate external communications (IOOV, 2011). The independent view of expert outsiders can further validate or question information and make decisions more reliable/credible. For example, in the *2011 sinking of the 't Loon shopping mall*, a professor of architecture pointed to specific weak construction parts. Another external expert was consulted to examine these parts, who confirmed their good condition (Engelbertink *et al*., 2012).

Anticipate conflicts of interest; build mutual trust in a dynamic process. (Strategic) crisis management response structures should anticipate differences in interest. However, the private interests of an external expert need not necessarily stand in the way of effective collaboration. The reports show that mutual trust is essential for effective collaboration. Nevertheless, if needed, the (strategic) crisis management response structure should always be willing to remove or exclude an expert from the crisis team. In the *2005 power outage in Haaksbergen,* initial collaboration with the energy network provider Essent went well. However, mutual trust was damaged when Essent announced that, contrary to expectations, the energy supply would not be restored that evening. The evaluation report concluded that the debate on the exact agreements made between the parties hindered adequate crisis management (Dorst *et al*., 2006).

The (strategic) crisis management response structure should remain in the lead. The position of external experts vis-à-vis the (strategic) crisis management response structure differs between crises: they can be included in the crisis team, carry out tasks under the supervision of the (strategic) crisis management response structure, or act largely independently. It may sound obvious, but the reports stress that the (strategic) crisis management response structure must, at all times, hold onto its coordinating role and make the final decisions.

The ship fire specialist company, Svitzer Wijsmuller offered its services several times during the *2007 ship fire in Velsen*, which is initially refused by the (strategic) crisis management response structure. At a later stage, when its expertise is needed, after internal discussions, the (strategic) crisis management response structure decided to involve the expert company. The evaluation report concludes that the way the company's expertise was involved contributed strongly to the adequate crisis management (Zannoni *et al.*, 2007).

Explicitly coordinate external communication. Many reports stress the importance of making clear arrangements with external experts regarding external communication. Experts may take part in external communications, either in a coordinated way or on their own initiative. Organizing specific moments, e.g. press conferences, to communicate pre-agreed messages creates clarity and consistency. Here, it is also important that specialized knowledge and jargon are 'translated' to create a clear and understandable message. In dealing with the *2003 scaffolding collapse in the Amercentrale* power station, the technical advice and skills of the energy company Essent and subcontractors Hertel and CMI were used. Due to a lack of pre-agreed arrangements, the subcontractors became involved in contacts with the media resulting in an inconsistent message being given to the public. The report concludes, "*it would have been better if the municipality had clarified the arrangements regarding the spokesperson directly with all parties involved*" (Helsloot *et al.*, 2004, p. 80).

4.6 CONCLUSIONS

While the importance of integrating expertise in responding to crises has often been put forward in the literature, studies that empirically focus on the role of experts in the response to crisis have remained scarce (for exceptions see: Rosenthal and 't Hart, 1991; Grönvall, 2001; Baekkeskov, 2014; 2016; Mendonça *et al.*, 2008). Strikingly, systematic knowledge on the consequences of consulting *external* experts during crises seems absent; both in the literature and in crisis management practice. In this study, we examined external experts in crisis situations: how frequent they are involved, what role they play, how their involvement affects the quality of crisis management, and what conditions facilitate adequate collaboration with the (strategic) crisis management response structure. We analyzed data from 114 post-crisis evaluation reports after 60 crises in the Netherlands. This research synthesis allowed us to provide systematic insights over a large number of cases based on a large amount of, well-grounded empirical data.

In our research synthesis, we observed that external experts are frequently, and sometimes in large numbers, involved in crisis responses. Their involvement in crisis responses not only stems from a demand for their technical expertise, but can also be a result of a threat to their organizations' existence and responsibilities. The involvement of external experts during the crisis response phase provides crisis managers with opportunities to integrate knowledge,

carry out complex tasks, and increase their legitimacy, albeit with the downside that it can threaten a loss in consensus, control, and public values. From an in-depth analysis of the evaluation reports reviewed, we qualitatively distilled ten conditions under which expert involvement contributes positively to adequate crisis management.

The systematic analysis of the empirical knowledge on the role of external experts in crisis situations points towards a number of interesting lessons for crisis managers and suggestions for further research. To start with, already in normal times (which in the Dutch context is labelled 'the cold stage'), (strategic) crisis management response structures should put effort into identifying and collaborating with experts. Without ongoing crises, (strategic) crisis management response structures operate under less political and time pressure, and are better able to more 'objectively' judge what expertise is present in the organization and what is lacking and may need to be brought in. Based on this 'risk analysis', they can identify what external experts it might be useful to build up a relationship with. This research finding is in line with Perry and Lindell's (2003) recommendation in the context of environmental threats. The authors state that, through vulnerable analysis, *"planners and public can more readily recognize the limits of their expertise"* (p. 341). In that way, the need for contacting experts who can bring in technical (e.g., geophysical or meteorological) knowledge becomes clear and is usually recognized. Further, since it will be easier to collaborate with someone you are familiar with, the cold stage can also be used to establish and maintain a network. In other words, effective expert involvement requires preparation and effort by the crisis management structure. We recommend future research in the areas of crisis preparation (e.g., building on Gilpin and Murphy, 2008; Scholtens, 2008) and on crisis networks and stakeholder collaboration (e.g., building on Comfort and Kapucu, 2006; Kapucu, 2006) to take this factor into account.

Another important lesson is that crisis managers should be aware of the consequences of involving experts. Although experts can help by filling important knowledge gaps, the study also points to potential negative consequences of expert involvement, an aspect which has, so far, not been extensively researched. In particular, involving *external* experts risks a loss in control and interference from conflicting interests. In that sense, expert involvement requires coordination to reduce these potential risks. The review shows that crisis managers sometimes have no choice other than to involve experts, and this strengthens the call to ensure that crisis managers have the guidance they need on how to manage the positive and negative consequences of expert involvement. Therefore, we recommend further studies that link the role of experts to the available theory on reputation and legitimization during crises (e.g., Christensen *et al.*, 2016; Coombs and Holladay, 2006); on crisis communication and knowledge transfer/dissemination (e.g., Coombs, 2014; Majchrzak *et al.*, 2007); sense and meaning making (Weick, 1988; Boin *et al.*, 2005); and crisis learning (e.g., Moynihan, 2009; Broekema *et al.*, 2017). A final suggestion for further research is to investigate the role of

experts in other, non-Dutch, institutional contexts to see if expert involvement might work differently under other governance systems with a different crisis management structure.

In the present study, we faced three main challenges. The first challenge relates to contingencies linked to the specific crisis situations (e.g, Rosenthal *et al.*, 2001). Since the development and outcome of a crisis is highly context-dependent (Johns, 2006; Pierce and Aguinis, 2013), drawing general conclusions is difficult. Nevertheless, by systematically studying statements in evaluation reports, we were able to distill systematic and insightful lessons. The second challenge concerns the selection of crises. Situations that could easily have developed into a crisis – so called 'latent crises' – but did not, maybe because of adequate management or expert interventions, have not been included in this study but could have provided valuable lessons. We decided to include all 'designated' crises, not only large-scale ones with extensive media coverage, to minimize selection bias. Finally, although based on extensive post-crisis investigations by experts, evaluation reports might not always provide balanced narratives for reviewing crisis management, for example because of political influences diluting negative findings (cf. Birkland, 2006; Elliott, 2009). The reports might also overlook/exclude data on informal consultations and the roles of legitimization and actors' private/individual interests. Overall, we found the reports to be rather similar in many respects, such as in their structures and methods of data collection. Hence, through our research synthesis, we have been able to report on an initial exploratory effort to collect and assess a relatively large amount of data on crisis management, which has enabled us to identify a number of key processes in expert involvement in crisis management, resulting in ten advisory points for crisis managers.

ACKNOWLEDGEMENTS

The data presented in this article were collected as part of a research project financed by the Research and Documentation Centre ('WODC') of the Dutch Ministry of Security and Justice, and conducted at the request of the National Coordinator for Security and Counterterrorism ('NCTV'). For the research report, see Van Eijk *et al.*, 2013. We would also like to thank prof. dr. Trui Steen (KU Leuven/Leiden University) for her useful comments during the final stage of the research project.