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

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CHAPTER 2

What factors drive organizational learning from crisis? Insights from the Dutch food safety services' response to four veterinary crises

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2.1 ABSTRACT

Although organizational learning has been studied extensively, empirical studies in relation to crises and theory building have remained scarce. This study explored what factors affect the learning process from crises of a public sector organization. We studied the responses of the Dutch food safety services (NVWA) to the veterinary crises classical swine fever (1997–1998), foot-and-mouth disease (2001), avian influenza (2003) and Q fever (2007–2010). Data from in-depth interviews with key experts in the organization and from crisis management documents pointed to political–economic context, social–emotional understanding, organizational structure, organizational culture, crisis management stage and organizational forgetting as key factors. Remarkably, post-crisis evaluation reports, leadership and a shared sense-making of what lessons to learn were not found to play a central role.

2.2 INTRODUCTION

Public organizations experience major difficulties in learning from crises. Contrary to a common assumption, many studies sustain that they often learn poorly or not at all (c.f. Smith & Elliott, 2007; Stern, 1997; Deverell, 2009; Roux-Dufort, 2000; Elliott, 2009). Learning from a crisis is a complex and challenging affair. Crises often are highly unique and unpredictable situations, in which complex circumstances of chaos and stress, politicization and a lack of reliable information make it difficult to distil clear crisis lessons (Boin *et al.*, 2008; Dekker and Hansén, 2004). At the same time, it is of the utmost relevance that organizations learn from crises in order to prevent or adequately respond to future ones, because the consequences of crises are severe and the tolerance for mistakes is low. Effective government action can in some crises literally mean a difference between life and death. The Dutch food safety services, named the 'NVWA',[5, 6] responsible for the management of veterinary crises in the Netherlands, is an exceptional case in that it seems to have actually learned extensively from crises over the past two decades. Among other things, it established a special crisis division, refined crisis protocols, created training and simulation programs, developed the use of personal protective equipment and created quick response teams. As a result, within the EU, many aspects of the NVWA's crisis management organization are now used as best practice for food safety services in other EU member states (cf. FVO [Food and Veterinary Office] 2013, 2014). Why did the NVWA manage to learn extensively from crises, while public sector organizations in general have such difficulty with this process?

There is a large literature on organizational learning (cf. Argote, 2013; Crossan *et al.*, 1999; Easterby-Smith and Lyles, 2011), as it is the key process through which an organization can improve its performance. Only a limited number of these studies, however, have delved in a systematic way into the process of organizational learning in the context of crisis situations (some important exceptions are Birkland, 2006; Deverell, 2010; Smith *et al.*, 2007; Stern, 1997; Toft and Reynolds, 1994). So far the process of crisis-induced learning remains not well understood – especially with regard to what factors drive the process (Smith *et al.*, 2007; Deverell, 2009). The building of theory on the basis of empirical research in this field has remained very scarce. Dekker and Hansén explain the complexity of learning in the context of a crisis: 'the need for learning is regarded highest under circumstances in which it is most difficult to achieve' (2004, p. 211). Aiming to clarify the process, we posed the question: *What factors drive a public sector organization's learning from crises?*

The aim of this explorative study was to gain insight into the different factors that affect the process of organizational learning from crises and to provide a framework for further research on the subject. Recognizing both a cognitive and an action perspective (see Fiol and Lyles, 1985), we understand organizational learning in this study as the acquisition of new

5 'Netherlands Food and Consumer Product Safety Authority'.

6 If we mention 'NVWA' in this article, we refer to either the NVWA itself or one of its predecessors.

knowledge and the translation of this knowledge into more effective organizational action. Using a structured single case study design (Yin, 2014), we studied the learning process of the NVWA from crises in the past two decades, by tracing back the factors behind the lessons learned (see Blatter and Haverland, 2012). In this period, the NVWA (or one of its predecessors) was faced with outbreaks of the classical swine fever (1997– 1998), the foot-and-mouth disease (2001), the avian influenza in (2003) and the Q fever (2007–2010). The NVWA is a relevant object of study because it can be viewed as a 'positive' case due to the extensive learning it accomplished, the special authorities and responsibilities it holds in the Netherlands regarding the management of veterinary crises and the exceptional fact of having faced multiple crises in the past decades. We used data from internal and external crisis management documents – evaluation reports, emergency action plans, crisis protocols and internal memos – as a basis for 17 in-depth interviews with key experts in the crisis management division of the NVWA. Taking an explorative approach, we used general insights from the literature as a starting point, yet led the experts indicate how learning manifested itself and what factors influenced the process and how.

We will start with a description of useful insights from the literature on organizational learning, the link between crisis management and learning and general insights on concepts related to the process of learning from crises. We describe the context of the crisis management in the field of food and consumer safety and animal health in the Netherlands, followed by an explanation of the research design including our choice of the NVWA as an object of study, and a brief discussion of the four major veterinary crises investigated. We then discuss the factors we found that affect learning from crisis in the NVWA and end with a discussion of the findings.

2.3 THEORETICAL FRAMEWORK

2.3.1 Organizational learning processes

Although the concept of organizational learning has been studied extensively (cf. Argote, 2013; Easterby-Smith *et al.*, 2011), so far no generally accepted definition or framework has been developed. Organizational learning is defined and measured in many different ways (see Bennett and Howlett, 1992; Crossan *et al.*, 1999; Howlett *et al.*, 2009). We argue that the many perspectives on learning by organizations [e.g., 'lesson drawing' (Rose, 1991), 'policy learning' (May, 1992), 'goal-based learning' (Moynihan, 2005)] inherently boil down to the same core mechanisms. Some scholars understand learning as a cognitive process, while others see it merely as an action process. Following the approach of Fiol *et al.* (1985), who recognize both a cognitive and an action dimension, we define organizational learning as

the acquisition of new knowledge and the translation of this knowledge into more effective organizational action.

The concept of organizational learning is to some extent metaphorical because it is only individuals within organizations that have the cognitive capability to draw lessons, and not organizations as such (Sabatier, 1987). Linking individual learning to an organizational setting, we see that several important learning processes come at play that are related to communication, which are discussed by Huber (1991). First, after new knowledge has been acquired, it needs to be 'distributed' through the organization. Distribution of information is important, as 'organizations often do not know what they know' (1991, p. 100). Multiple studies show that within an organization, groups play an important role in the distribution of knowledge between individuals (see Argote, 2013; Crossan *et al.*, 1999). Second, through the process of 'interpretation', individuals within an organization create a shared understanding of information. Finally, through 'organizational memory', new knowledge can be embedded in the organization, so that it can be retrieved when needed (see Argote, 2013; Levitt and March, 1988).

In the literature, organizational learning has been demonstrated in many different ways: as changes in beliefs, ideas, culture, policies, knowledge, procedures, routines, structures, protocols, legislation and behavior (Bennett *et al.*, 1992; Carley and Harrald, 1997). Taking an instrumental and open approach here, we do not exclude any of these in advance, but take into account those aspects that are perceived as representing learning by the employees of the organization studied. We will now link organizational learning to a crisis context, which brings in a new dimension. Or, as Moynihan explains, 'the topic of learning during crises [also] needs special attention because it is different from learning in routine situations' (2008, p. 350).

2.3.2 Learning as a challenge in crisis management

In the crisis management literature, organizational learning is generally viewed as one of the central processes as well as challenges in crisis management. Through learning, an organization can enhance its crisis management capabilities and build resilience (Crichton *et al.*, 2009). Public organizations generally experience long periods of stability or incremental change, which are suddenly interrupted by unsettling events that create opportunities for major change (Baumgartner and Jones, 1993; Kingdon, 2014). Typically, crises – situations of high uncertainty and urgency, in which the vital interests of a society are under threat (see Rosenthal *et al.*, 2001) – function as a trigger for organizational change. Because change is a central part of the concept of organizational learning, in theory, crises can be major initiators for learning as well. People also *expect* public organizations to learn from crises in order to safeguard them from future disaster. In theory, learning from a crisis is a rather straightforward process: the causes of the crisis event are revealed through evaluation, after

which flaws are addressed by the implementation of changes in the organization (Birkland, 2006). Learning following a crisis, for example through readjustments in culture (Turner, 1978), leads to improved management processes within the organization. Improved management processes subsequently make an organization less vulnerable for the incubation of crisis – the process through which an incident evolves into a crisis (Turner, 1976; 1978). In theory, through a continuous process of learning from errors, a 'high-reliability organization' could be created – an ideal type of organization carrying out vital tasks in society that is resilient to crises as it adapts quickly to changes in a complex environment (see Weick & Sutcliffe, 2001).

However, as Smith and Elliott explain, 'despite contrary evidence, an underlying assumption of many studies is that organizational learning tends to follow a crisis' (2007, p. 519). In reality, public organizations are found to experience major problems with crisis-induced learning and often fail to learn (see Deverell, 2009; Elliott, 2009; Roux-Dufort, 2000; Stern, 1997). Learning in the context of a crisis is an inherently complex affair for several main reasons. First, social and technological systems in modern society are complex and tightly coupled, which makes it hard to obtain a comprehensive view of potential causes of incidents (see Sagan, 1993). Second, crises are uncommon and highly unique occasions, as consequences of a contingent combination of events, which makes drawing general lessons difficult (see Crichton *et al.*, 2009). Third, crises happen unexpectedly and are often largely unpredictable, so that it is difficult to prepare for them through adopting organizational changes. Finally, the evaluation of 'latent' crises – events with a potential of disaster that have turned out well or have been prevented from happening – is rather problematic as one does not know how events would have developed, although important as regards learning. Having outlined the key challenges of learning from crises and related characteristics of the process, we will now discuss what insights the literature offers on the potential factors affecting learning from crises.

2.3.3 Concepts related to crisis-induced learning

As discussed earlier, studies that have a main focus on organizational learning, explicitly addressing learning in a crisis context, are scarce and the factors that drive the process are as yet unclear (Deverell, 2009; Smith *et al.*, 2007). However, the literature on public administration and management, particularly the streams of crisis management and organizational learning, do provide useful insights into factors that are potentially related to the crisis-induced learning process. In the current literature, we can distinguish the following seven broadly defined factors, that we used as theoretical background for our study and as a point of departure to formulate sensitizing concepts for the empirical data collection.

Politicization

Crises can become intensely politicized in a short time frame. Because the political stakes are high, various kinds of stakeholders struggle to push through their interests. Several studies suggest that politicization is an important factor influencing the organizational learning process (Dekker *et al.*, 2004; Stern, 1997). However, what exact role politicization plays remains unclear, because both positive and negative roles are attributed to it (Broekema, 2016). On the one hand, politicization puts pressure on an organization to adopt lessons from a crisis. On the other hand, because actors involved struggle over different interests through blaming and framing (Brändström and Kuipers, 2003), a situation is made more complex so that distracting clear crisis lessons becomes increasingly difficult (Boin *et al.*, 2008). In addition, political pressure creates an incentive for an organization to (quickly) adopt changes that are not firmly based on increased knowledge and thorough reflection and therefore reflect mere change rather than 'real' learning (see Broekema, 2016; May, 1992).

Shared sense-making (of what lessons to learn)

Crisis can be seen as a social phenomenon strongly related to people's perceptions of events. Typically, after a crisis, multiple interpretations circulate on what happened, the causes of the events, questions of responsibility and what lessons should be learned (see Olson, 2000). Crises create a strong sense of chaos, disrupting people from their regular day-to-day routines (Torenvlied *et al.*, 2015). 'Sense-making' is a central part of the process of returning to normality again, as meaning is given to events and a shared understanding is created (Boin *et al.*, 2005; Weick, 1995). In this process, stories, emotions and symbols play a central role (see 't Hart, 1993). Due to cognitive limitations, people are bounded in understanding the full complexity of the events. The many interpretations that circulate in the media together with large streams of subjective and ambivalent information make it difficult to formulate concrete crisis lessons (Dekker *et al.*, 2004). A shared understanding of the causes of events and what changes should be made to prevent future crises might facilitate the effective implementation of crisis lessons.

Organizational culture

In the literature, the culture of an organization is often related to organizational learning and crisis management (e.g., Reason, 1997; Turner, 1978; Wang, 2008). As outlined earlier, organizational learning largely takes place in groups of individuals. Shared ideas, values and norms influence the communication between individuals and hence the dissemination of knowledge (Huber, 1991). In a safe and open environment without any fear of blame, people are more willing to admit errors. In a safety culture, in which there is strong commitment to learning, people focus on detecting and communicating of errors (Weick *et al.*, 2001). In particular, in times of chaos and stress, an informal culture with close personal ties might

contribute to an adequate exchange of knowledge. A reinforcing culture that motivates people to improve and innovate encourages people to acquire knowledge and actually implement changes (see Argote, 2013). Schein refers to this as the 'learning culture', in which 'members must hold the shared assumption that learning is a good thing worth investing in' (2010, p. 366). However, a strong organizational culture can also be less open to change, for example because it increases a risk of group think, which limits a critical reflection of deviating information and viewpoints.

Organizational structure

The structure of an organization generates the conditions in which learning can take place (Fiol *et al.*, 1985). The capacity of an organization delimits the opportunity to actually acquire knowledge and implement changes based on that knowledge. The decision-making structures determine how an organization responds to drastic changes in the external environment (see Fiol *et al.*, 1985). To accomplish learning, an organization needs to have sufficient capacity. Structuring processes, for example adopted in protocols and plans, can facilitate learning because they encourage people to take part in learning processes such as exchanging information (see Moynihan, 2009). At the same time, protocols can also inhibit learning, because learning from crisis requires change in regular behavior and flexibility (see Gilpin and Murphy, 2008), while people often have difficulties with departing from protocols. Lagadec (1997) explains that structured debriefing meetings and simulations contribute to reflection on events and to crisis preparation.

Stage in crisis management

Crisis management models distinguish different stages in crisis management in which different processes take place, approaching crisis management as a cyclical process (cf. Smith, 1990; Veil, 2011). In the crisis *response* stage, the operational response to the crisis is organized, while in the *revision* stage, it is looked back on what went wrong, how and what changes are to be made (Coombs, 2012). In these different stages of crisis management, an organization can have different aims of learning, either prevention or response (Deverell, 2009). Moynihan (2008) distinguishes between intercrisis learning, that is learning from one crisis in order to prevent or more effectively respond to a next one, and intracrisis learning, that is aimed at improving the crisis response activities during the actual crisis. Learning during a crisis is generally considered a much more challenging process than learning post hoc, because of the complexities of crisis dynamics such as time limitation, political pressure, chaos and media scrutiny.

Post-crisis evaluation reports

Many studies point to post-crisis evaluations as playing an important role in the crisis-induced learning process (e.g., Elliott, 2009; Turner, 1976). From a technical perspective on learning (commonly adopted, especially in early studies on learning), evaluation studies are essential to learning, as they are the means through which an organization acquires feedback on previous actions (Howlett *et al.*, 2009). The rationale is that public inquiries reveal the causes of a crisis and the flaws in the organization, which can then be addressed by implementing changes. However, many scholars are critical of the actual role of post-crisis evaluation reports in the learning process, often emphasizing political influences and context (e.g., Birkland, 2009; Elliott and McGuinness, 2002). Furthermore, post-crisis evaluation reports are found to vary widely in such respects as design, standards and evaluation organization.

Crisis leadership

Finally, leadership is related to crisis-induced learning through the prominent role public leaders have in crisis management, especially during a crisis (Boin and 't Hart, 2003; Boin *et al.*, 2005). In an organization, public managers decide what to focus on in the learning process, who is involved and what interventions are taken at what specific time (Crossan *et al.*, 2011: 452–453). Leaders committed to learning can have an encouraging role and provide the conditions for people to learn (Schein, 2010). They can provide vision and establish contacts between people from different parts of the organization. Instead of being focused on learning, during and after a crisis, public leaders can also get caught up in political aspects of the crisis such as the struggle over accountability and responsibility (Boin *et al.*, 2003, 2008).

We now provide some fundamental background information on the Dutch food safety services' crisis management organization, which in the Netherlands is nationally entrusted with crisis management tasks in relation to animal disease outbreaks, and which served as the case to explore the factors that drive organizational learning from crises.

2.4 THE NETHERLANDS FOOD AND CONSUMER PRODUCT SAFETY AUTHORITY AS A CRISIS MANAGEMENT ORGANIZATION

Intensive livestock breeding in the Netherlands covers a relatively large share of the national economy compared to other countries and is heavily entwined with other parts of the Dutch economy. Despite its small territory, the Netherlands is the largest exporter of live animals in Europe, and one of the largest in the world, with more than 40,000 livestock breeders in the country and more than 12 million pigs alone (CBS, 2016). The Netherlands Food and Consumer Product Safety Authority (NVWA) is a government agency operating for

the Ministry of Economic Affairs (EZ) and the Ministry of Public Health, Welfare and Sports. The NVWA is responsible for monitoring the safety of food and consumer products, safeguarding the health of animals and plants, animal welfare and nature legislation in the Netherlands. The main tasks of the NVWA are supervision, risk assessment and risk communication regarding these aspects (NVWA, 2014).

Every year, the NVWA has to deal with multiple incidents that threaten the safety of food and consumer products or the health of animals and plants, and typically have the potential to quickly arouse intense public attention and debate. Recent examples are the bluetongue outbreak in 2006–2008, the *E. coli* outbreak in 2011 and the horse meat affair in 2013, all classified as 'incidents' by the NVWA. The NVWA's Incident and Crisis Centre (NVIC) – part of the Veterinary and Import Division – is entrusted with incident and crisis management tasks related to notifiable animal diseases. The NVIC is tasked with the coordination of the first response to animal disease notifications and the prevention, preparation, risk assessment and handling of suspected outbreaks. In addition, the NVIC provides support regarding serious incidents in other areas under the NVWA umbrella (NVWA, 2014). The NVIC has a permanent staff of 16 experts and is led by the Chief Veterinary Inspector (CVI). It is a matrix organization that in times of crisis recruits the vast majority of its manpower from other sections of the NVWA. The NVIC can draw upon 60 specialized animal disease experts, which are all official veterinarians. When a suspected case of a notifiable animal disease is reported, a trained 'expert team' – consisting of an animal disease expert, a veterinarian of the GD Animal Health[7] and the private veterinarian – is sent to the location for investigation. Subsequently, if the notifiable disease is confirmed, the operational response in the first three days of an outbreak is handled by what are called the 'front teams'. Each of the 16 front teams available consists of six people from different divisions of the NVWA: one coordinating veterinarian, one veterinarian, one assistant to the veterinarian, one health and safety worker, one administrator and one enforcer. Before and during a veterinary crisis, the NVWA/NVIC works within a large network of public, semi-public and private actors at different administrative levels, such as mayors (local), the Public Health Services ('GGD') (regional), agricultural interest groups, such as 'LTO', and the National Institute for Public Health and Environmental Protection ('RIVM') (national), the SCoPAFF[8] and the European Food Safety Authority ('EFSA') (EU), and the World Organization for Animal Health ('OIE') (global) (FVO, 2013; NVIC, 2014).

7 Gezondheidsdienst voor Dieren (Dutch animal health services).

8 Standing Committee on Plants, Animals, Food and Feed, formerly known as SCoFCAH.

2.5 METHODS

In this study, we used a structured single case study design (Yin, 2014), taking a causal-process tracing approach (Blatter *et al.*, 2012) to qualitatively study the NVWA's learning regarding crisis management in response to veterinary crises. We conducted an explorative study into the factors that affect organizational learning from crises. Although we used the literature as a general basis for understanding related concepts and potential factors of influence, the empirical data were the leading element in our study (see Dubois and Gadde, 2002). We concluded the analysis by aligning the empirical results with theoretical insights, approaching it as an iterative process (Dubois *et al.*, 2002; Yin, 2014). An in-depth case study design was chosen to do justice to the complexity of the process of organizational learning in relation to crisis, with (potentially) multiple factors at play which are strongly embedded in the specific crisis contexts.

We selected NVWA's crisis management organization as our object of study on the basis of several criteria. First, we identified the NVWA as an exceptional or 'positive' case. Blatter and Haverland explain that 'in the ideal-typical form of the CPT [causal-process tracing approach], those cases that show a strong positive result with respect to the outcome of interest are selected' (2012, p. 25). This approach is intended to reveal what factors (X) made outcome (Y) occur. Contrary to the usual situation reflected in the recent studies discussed earlier, the NVWA seems to have learned extensively from crises in the past decades. On EU level, the FVO [Food and Veterinary Office][9] evaluated the NVWA crisis management organization in relation to animal health very positively: 'the competent authorities are well prepared for handling minor and major outbreaks of epizootic diseases' (2013, p. 16), and many aspects of the NVWA crisis management organization are used as 'best practice' among food safety services of other member states[10] (FVO, 2013, 2014). Second, the NVWA provides a unique opportunity to analyze organizational learning behavior in relation to different crises for one and the same organization. Rarely does an organization have to face as many large crises as the NVWA did. Third, the NVWA holds important authorities and autonomy specifically regarding the crisis management of outbreaks of animal diseases in the Netherlands. Part of the organization is continuously active in preventing, preparing for, responding to and evaluating incidents and crises. Finally, the NVWA as a case provides rich empirical insights into the dynamics of a crisis management organization in the food safety sector, a type of 'high-reliability organization' – facing dozens of incidents a year that potentially have devastating societal consequences – that is not studied often. Generally, primary data from this sort of organization are available on only a very limited

9 Currently the DG Health and Food Safety. As part of the Health and Consumers Directorate-General of the European Commission.

10 Based on the conclusions from FVO audits.

scale.[11] Within the NVWA, we focused on the crisis management organization including the 'NVWA Incident and Crisis Centre' (NVIC), responsible for crisis management tasks in the field of food and consumer safety and animal health on a daily basis. As cases for analysis, we selected those crises that (1) were officially announced by the government as 'crisis', that is with a large-scale societal impact in the Netherlands, (2) concerned animal disease outbreaks and (3) took place after 1995. The four crises that meet these criteria are the outbreaks of classical swine fever in 1997– 1998, foot-and-mouth disease in 2001, avian influenza in 2003 and Q fever from 2007 to 2010.

The primary data for this study were derived from 17 in-depth semi-structured interviews with 'key experts' in the NVWA crisis management organization: senior (veterinary) inspectors working at the NVIC or in the front teams. We selected employees for interviews on the basis of their organizational function, level and involvement in the crisis response for at least two of the four crises analyzed. We interviewed seven front-line workers, six operational managers[12] and four managers (see Table 2.1). Each interview was conducted by two researchers, lasted between an hour and an hour and a half, and was recorded and transcribed. At the start of the research project, a working protocol was established, including agreements with the NVWA regarding confidentiality, of which we informed the interviewee at the beginning of each interview. Two senior officials of the NVWA checked a draft version of this article for factual inaccuracies.

Our knowledge base for the in-depth interviews was secondary data from internal and external documents: crisis handbooks, emergency action plans, crisis protocols, internal memos, crisis evaluation reports and general reports (see Table 2.1). We questioned each respondent on the crisis lessons learned by the NVWA and the factors that he or she thought induced these lessons. As a point of departure, we used the broad categories distilled from the literature, as discussed in the theory section, treating the main concepts as 'sensitizing concepts' (Van den Hoonaard, 1997), but let the empirical data define them. We used latent content analysis and coded the interview transcriptions per sentence on (1) interviewee, (2) topic of crisis lesson, (3) crisis context and (4) factor categories: 'politicization', 'shared sense-making','organizational culture', 'organizational structure', 'crisis management stage', 'post-crisis evaluation reports', 'leadership' and 'other'. In a second round of coding, we recoded the data in new categories that better fit the empirical data: 'political–economic context', 'social–emotional understanding' and 'organizational forgetting' emerged. The coding was done by one researcher, and coding was discussed within the research team in cases of doubt. Note that we did not aim to 'measure' any 'effects', but to provide a first insight into the factors that drive organizational learning from crises.

11 Because the researchers were part of a long-term research project (2011–2016) at the NVWA, they had a unique access to internal data.

12 Within the organization called 'operational crisis consultants'.

Table 2.1 Data collection

Method	No.	Source (document/expert)
Expert interviews	17	
Front-line workers	7	Senior (veterinary) inspectors; senior inspector who is front team coordinator; (veterinary) inspectors who are front team members
Operational management	6	Crisis coordinator NVWA; senior policy advisor; senior staff members NVIC; senior veterinary officer
Management	4	Chief veterinary inspector; deputy chief inspector NVWA; head of NVIC; head of department of veterinary teams
Document analysis	27	
Crisis handbooks	3	NVWA handbook for incident and crisis management (2014); Departmental handbook for crisis decision-making (2014); National handbook for crisis decision-making (2013)
Emergency action plans	4	Policy emergency action plan CSF and ASF (2013); Policy emergency action plan FMD (2013); Policy emergency action plan AI, NVWA (2013); Policy emergency action plan AI, Ministry of Economic Affairs (2014)
Crisis protocols	3	Emergency action plan handling suspicions of animal diseases and zoonoses, NVIC (2014); Emergency action plan AI (2007); NVIC emergency action plan animal disease control AI, CSF/AVP and FMD (2014)
Internal memos	2	Report on evaluation meeting QF (2010); Internal evaluation report QF (2010)
Main crisis evaluation reports	4	CSF evaluation (SEV and D&T, 1998); FMD evaluation (Abbas *et al.*, 2002); AI evaluation (Den Boer *et al.*, 2004); QF evaluation (Van Dijk *et al.*, 2010)
General reports	11	CSF reports (LNV, 1997; Alterra, 2007); FMD reports (LEI, 2002); AI reports (Impact, 2004; RIVM, 2004); QF reports (National Ombudsman, 2012; RIVM 2011; PWC, 2012); Reports on zoonoses (RIVM, 2010); Reports on NVWA (FVO, 2013, 2014)

Note: CSF: classical swine fever; FMD: foot-and-mouth disease; AI: avian influenza; QF: Q fever.

2.6 FOUR VETERINARY CRISES IN A ROW

We studied four crises with a high societal impact: outbreaks of the classical swine fever in 1997–1998, the foot-and-mouth disease in 2001, the avian influenza in 2003 and the Q fever in 2007–2010.

2.6.1 Classical swine fever crisis, 1997–1998

The outbreak of the highly infectious classical swine fever (CSF) in the Netherlands between February 1997 and May 1998 (end of the epidemic) had a dramatic social and economic

impact in the Netherlands. Thousands of farms were affected by export and transport bans, buy-out and take-over measures and culling measures. Four hundred and twenty-nine livestock holdings saw their animals culled because these holdings proved to be infected and another 1,286 livestock holdings have been culled pre-emptively; in total, more than 10 million pigs were killed. The crisis took hundreds of thousands of man-hours and cost society billions of Dutch guilders (SEV and D&T, 1998).

2.6.2 Foot-and-mouth disease crisis, 2001

The foot-and-mouth disease outbreak in the Netherlands between 21 March and 25 June 2001 had far- reaching social, economic and political consequences. At the end of the foot-and-mouth disease outbreak, the first time under the European 'nonvaccination policy', a total of 26 infected holdings had been confirmed. A total of 2,974 holdings were culled pre-emptively. Measures taken by the government included a transport ban, an export ban, suppressive vaccinations and culling of livestock holdings. Around 270,000 (cloven-hoofed) animals were culled on infected farms or pre-emptively, of which almost 200,000 had been vaccinated. Another 119,000 animals were culled for welfare reasons. The total economic damage of the foot-and-mouth disease outbreak was estimated at 900 million euros. The large-scale culling of healthy animals met with enormous resistance in society, especially among farmer communities. In the farmer village of Kootwijkerbroek, emotions became so tense that three officials were held as hostages by farmers and the riot police was needed to restore order (Abbas *et al.*, 2002).

2.6.3 (Highly pathogenic) Avian influenza crisis, 2003

Avian influenza – also known as bird flu – had broken out in the Netherlands for the last time in 1926. In subsequent decades, it occurred in Europe in the United Kingdom, Germany and Italy. In February 2003, an outbreak of the highly pathogenic avian influenza variant hit the Netherlands, and lasted until August of that year. This avian influenza crisis had a large-scale social and economic impact in the Netherlands. A total of around thirty million animals – 30% of all poultry in the Netherlands at that moment – were culled on infected holdings, pre-emptively or for welfare reasons. This involved more than 1,400 livestock holdings and fifteen thousand small backyard flocks. At 241 locations, the presence of the avian influenza virus was confirmed. Measures taken by the government were a transport ban, an export ban, mandatory indoor housing of poultry and a ban on gatherings of poultry. On 17 April 2003, a veterinarian active during the crisis died as a consequence of the virus. The costs of the crisis were estimated at 270 million euros, with the economic damage at another several hundred million (Den Boer *et al.*, 2004).

2.6.4 Q fever crisis, 2007–2010

The outbreak of Q fever in the Netherlands in the period of 2007 until the summer of 2010 – the greatest Q fever epidemic in the world until today – had a dramatic impact on Dutch society, both socially and politically. The Q fever is a zoonotic disease which means that it is contagious from animals to humans. The government decided to cull 62,500 pregnant goats and sheep at 88 holdings in an attempt to contain the disease. Other measures taken included the vaccination of goats, a transport ban for infected holdings and hygiene regulations for the whole goat sector (Van Dijk *et al.*, 2010). Over the period 2007 until 2010, around 4,000 infections of humans were reported, and a registered 19 people died as a result of the disease (RIVM, 2016).

2.7 ANALYSIS: FACTORS DRIVING LEARNING

We found that the NVWA has learned many lessons in the field of crisis management since the outbreak of classical swine fever in 1997. These relate to external communication (with farmers, the livestock sector, the public), work safety (protective equipment, psychological care, vaccination, working hours), organizational structure (centralization, establishing an incident and crisis centre, front teams), cooperation with other parties (public/private experts), organizational routines (crisis protocols, culling and rendering methods, education and training programs), public safety (hygiene measures, intake of used materials) and animal welfare (culling methods, inspections in the sector). We identified *six key factors* that drove the learning of these lessons, shown in Table 2.2. Below, we discuss each of these factors in more detail.

2.7.1 Political–economic context

The NVWA's learning from crises is strongly affected by its political–economic context, more specifically political pressure and budget cuts. The experts explain that *political pressure* works in two directions. On the one hand, politics, as the higher authority, puts pressure on the NVWA to actually draw crisis lessons. As an expert explains, 'if you do not learn lessons, you will quickly receive a hundred parliamentary questions'.[13] Political attention is needed if decisions for change are to be taken and to obtain the means and capacity for implementation. On the other hand, political pressure can prevent lessons from being incorporated or lead to changes that do not reflect learning. An expert explains that in the Q fever crisis, because of its controversial nature, politics opted quickly for large-scale destruction of animals, despite the recommendation of the NVWA to adopt a vaccination policy partly on the basis of experiences from previous crises. They also mention political interests of the large farming economical sector in cases inhibiting learning.

13 All interview quotes were translated from Dutch.

The experts identify the drastic *budget cut* by the EU after the swine fever crisis (1997–1998) as a major breakthrough for learning by the NVWA, functioning as a basis for most lessons learned afterwards. The European Commission decided to cut the Dutch government's compensation budget for the crisis by about 100 million euros, largely for not having adequately archived their actions and for working with inadequate and outdated crisis protocols. This received heightened political attention and criticism at national level. The immediate result was that the Dutch food safety authority learned extensively. It completely renewed its crisis protocols and set up an adequate archiving system. As a result of these improvements, the European Commission was much milder on the NVWA's response in the foot-and-mouth disease crisis in 2001, hardly cutting the budget for the Netherlands. Finally, in relation to budget issues, the experts also note that austerity cabinets make it financially hard to implement changes in the organization.

Table 2.2 Key factors found to drive organizational learning from crisis and their aspects

External	**Political–economic context**	**Social–emotional understanding**
	1. Political pressure Political attention, decision-making authority, political–economic interests *2. Budget cuts* Budget cuts (e.g., the drastic cut from the EU after the classical swine fever crisis), austerity cabinets	*1. Social–emotional events* Specific social–emotional events (e.g., riots in Kootwijkerbroek in the foot-and-mouth disease crisis; the death of a veterinarian in the avian influenza crisis) *2. Media attention* Strengthening social–emotional understanding
Internal	**Organizational culture**	**Organizational structure**
	1. Intercollegial relations Open atmosphere, mutual trust, personal contacts, discussion, consensus on crisis lessons *2. Motivation* Intrinsic motivation, pride in working for the team, challenge, professionalism	*1. Structure of organization* Capacity, crisis management division (creation of NVIC and structure of front teams), limited team size, reorganizations *2. Structuring processes* Crisis protocols, training and education programs, post-crisis evaluations
Process-related	**Stage in crisis management**	**Organizational forgetting**
	1. Crisis cycle Crisis response stage vs. post-crisis revision stage *2. Sequence of events* Recurrence, incrementality, fine-tuning (e.g., working hours, destruction methods, improvements of crisis protocols)	*1. Outflow of expertise* Retirement, reorganizations, forgetting *2. Retaining of knowledge* Crisis experience, knowledge dissemination, protocols, training, simulations

2.7.2 Social–emotional understanding

A number of *events* had a *large social–emotional impact* on the public and on employees in the NVWA, which led to the adoption of large-scale improvements. All the experts point to the dramatic events that took place in the farming village of Kootwijkerbroek in 2001 during the foot-and-mouth disease crisis. Angry farmers, not agreeing with NVWA measures, used violence against veterinary inspectors, taking some of them hostage and hanging dead animals, with the names of crisis managers on them, from trees. The anti-riot police were called in to restore order. For NVWA inspectors, the events were a social–emotional drama; they experienced it 'no longer as a crisis, but war'. Even though the riots happened a long time ago, the events are still fresh in the minds of team members. 'Kootwijkerbroek', as the experts refer to the events, directly led to drastic improvements in the NVWA's external communication to the public in general and specifically to farmers. Farmers were kept informed, during a crisis but also already in noncrisis time, employees were trained in communication with farmers, and spokespersons for the media were installed. In addition, the NVWA showed it had directly learned from 'Kootwijkerbroek' by introducing psychological support for its workers. Another social– emotional event that led to learning on the part of the NVWA was the death of a veterinarian during the avian influenza crisis as a direct result of the virus. This event led to improvements in the field of personal safety. The organization developed the use of personal protective equipment such as protection suits and masks and, already during the crisis, the NVWA started providing antiviral drugs and carrying out vaccinations of team members in the field.

Media attention increases the impact of social–emotional events by magnifying emotions and involving the wider public. During the Q fever crisis, not only the preventive culling of large numbers of healthy pregnant animals but especially the many human victims received extensive media coverage. An expert explains that the extensive media attention for the issue of public health contributed to the NVWA closing an agreement of cooperation with the Public Health Services ('GGD') and including them in their crisis management plans, in order to effectively involve their expertise and cooperate with them in times of crisis.

2.7.3 Organizational culture

Intercollegial relations function as a condition for sharing information and knowledge within the organization. The experts explain that an open atmosphere within the team facilitates internal communication through exchange of information and openness about mistakes made. Good personal contacts, where 'almost everybody in the team of around 100–120 people [in the front teams] knows everybody else personally' and the team 'is functioning like a real family', create a climate of mutual trust and a feeling of companionship which are felt to be essential for organizational learning. In an environment of trust, crisis events can be discussed openly, also across different levels of the organization. In this respect,

the respondents emphasize the importance of meetings, both formal (e.g., training) and informal.

The experts also point out that the high *motivation* of employees in the crisis organization means that much effort is put into learning processes to improve the organization's performance. The experts explain that members of the crisis management team have an intrinsic drive towards increasing their knowledge and doing things better, and relate this to the fact that only highly motivated and competent people are selected from other parts of the organization, which creates professionalism. People sign up for the front teams on their own initiative and work on a voluntarily basis, getting paid only for their extra hours during crises. They are therefore proud to work in the crisis management team, which holds a high status within the NVWA. To stimulate motivation and challenge employees to learn, trainings and simulations provided by the NVWA are considered important.

2.7.4 Organizational structure

As regards the *structure of the organization*, the presence of a crisis management division and the human and financial capacity make it possible that time and effort are spent on evaluation and drawing lessons. With the establishment of the NVIC in 2003, a team was created that deals with crisis management tasks full-on. An expert explains that this allowed the implementation of larger changes and hence more extensive learning. Expertise was built to enable people to actually draw lessons and retain these within the organization. At the same time, experts point to the downside of a large team size: it makes the dissemination of knowledge through the team more challenging, especially because personal contacts are weakened. Also, reorganizations are felt to be disastrous for learning, because replacing people makes them preoccupied with getting used to their new tasks and role in the team and disrupts the learning culture.

We found *structuring processes* in the organization to shape behavior in such a way that learning processes can actually take place. Employees in the crisis management organization need to follow crisis protocols that were established and adjusted in the course of the different crises. Since the avian influenza crisis, the NVWA has installed general crisis protocols besides disease-specific ones. The protocols affect learning, for example because they include a debriefing–briefing principle: during a crisis, at the end of every day, team members meet and share their experiences with other team members and team leaders (*debriefing*). This principle ensures that lessons are drawn and communicated to the management level, which can then carry through changes in the crisis response for the following day (*briefing*). At the same time, however, experts explain that crisis protocols can also inhibit learning, because people are less inclined to alter their behavior if the situation requires it. Crises typically demand a quick adaptation to unexpected circumstances that can hardly be included in protocols. Since the avian influenza crisis, the learning process

has been stimulated by another structuring process: the training and education program provided by the crisis centre.[14] Team members learn the theory on specific animal diseases through lectures from external experts, making them better prepared for an outbreak. On training days, team members work on solving a practical problem in a simulation setting, learning by experience and feedback, so that crisis response actions are improved.

2.7.5 Stage in crisis management

In the response stage of the *crisis cycle, when the crisis response activities take place,* there is a great urgency for the organization to optimize its actions, because during this period, the consequences of the crisis can still be contained. This urgency has stimulated the NVWA to quickly adapt its response to the crisis events in order to restore normality as quickly as possible. An expert explains: 'We start learning from the first day of the crisis onward'. Lessons learned during a crisis are focused on improvements of actions during that crisis. Because of the urgency, lessons are generally not institutionalized within the organization during a crisis. In the post-crisis revision stage, when normality has been restored, there is time for reflection and more structural changes can be implemented, such as changes in protocols. For example, the NVIC needed a quiet period to sign contracts[15] with around 15 external specialist parties for their support in crisis time. In this way, external expertise and capacity – ranging from a catering company and a disinfection service, to assistance in catching the fowl for culling – can be deployed quickly at the crisis location, which improves the crisis response and reduces the costs. In the revision stage, learning is focused not only on the response but also on the prevention of future crises. The 'scarce times of calm between crises', that is what the team members often call 'peacetime', are essential to reflect on events and incorporate lessons for the longer term. At the same time, paradoxically, if lessons are to be learned, the crisis events should not be too long ago and still fresh in the minds; as an expert explains, 'learning from crisis is striking while the iron is [still] hot'.

Most extensive lessons learned by the NVWA have required a specific *sequence of events* and recurrence of urgency to be fully adopted. Crisis lessons are often learned incrementally over time, through a process of adapting, fine-tuning and ripening over different crises. In the classical swine fever, crisis members of the crisis team made long working hours, from early morning till late at night for several weeks. Exhaustion regularly led to safety incidents. In the foot-and-mouth disease crisis, the working hours were improved; they were further refined in the avian influenza crisis when a rotation system for both team members and team leaders was introduced; and even further improved in the Q fever crisis, when stricter rules were set and the substitution of complete teams was introduced. Another example regards the animal culling methods. In the swine fever crisis, the culling and disposal process was

14 Three days a year for the animal disease experts; one day a year for front team members.

15 Convenants.

perceived as suboptimal, because initially there was no clarity about the culling method and there were not enough vehicles to transport the carcasses. One expert explains about the initial situation: 'We had to cull around two hundred thousand animals, but we had no exact idea how to do that yet'. In the avian influenza crisis, culling methods were gradually improved, but the disposal of carcasses was not considered efficient yet. In the Q fever crisis, although having to handle different numbers of animals[16] and the major improvements were made by now, the NVWA further adjusted lessons regarding the culling and disposal process.

2.7.6 Organizational forgetting

Finally, the experts point to organizational forgetting, that is the *outflow of crisis expertise* and experience, as an important factor affecting organizational learning. Retaining and disseminating knowledge and experience within the organization are considered crucial if the NVWA is to learn over a longer period of time. If knowledge acquired in some parts of the organization is lost, it means that organizational changes will not be implemented either. People with expertise, knowledge and skills acquired from previous crises are needed to be capable of drawing lessons in the first place. Experienced team members leaving the organization (often through retirement), as well as reorganizations, induce organizational forgetting. It is particularly the older team members who have been involved in multiple crises, often in different roles. The experts explain that most crisis lessons are stored in the brains of specific people. An expert explains 'there is just so much experience; it is terrifying, because these people are also getting older'. Retirement creates the main knowledge drain from the organization. Also, when people are placed in other divisions, group learning structures are affected. When responding to the outbreak of classical swine fever in 1997–1998, for example, the crisis management team lacked the knowledge of experts who had experienced the earlier swine fever outbreak. After the earlier swine fever crisis, the team members went quickly back to their regular work and did not come together anymore to share their knowledge. Also, meanwhile experts had left the organization. An expert explains that, as a consequence, some important knowledge needed during the foot-and-mouth disease crisis was not available and 'the wheel needed to be reinvented again'.

Crisis lessons can be *retained* within the organization only partially by including them in emergency plans and protocols and regularly updating them. The NVWA attempts to forestall the process of organizational forgetting by actively sharing knowledge through training, exercises and crisis simulations for personnel. Every year, five to 10 young veterinarians are newly recruited and receive training so that the lessons are transferred to them. Younger, inexperienced personnel is linked to and accompanied by older, experienced team members.

16 Note that the logistics needed for the culling and disposal process largely differs between the crises due to the large differences in number and kind of animals.

The experts state, however, that crisis lessons can be acquired through training and exercises outside crisis time to only a limited extent. For extensive learning, people need to actually experience real crisis situations. Paradoxically, for an organization to learn to prevent crises and not to forget the lessons learned, crises do need to take place every now and then, or, 'knowledge is only built if it is actually used'. An expert explains that if the avian influenza broke out now, 'everything will start working automatically', due to recent experiences with it. In contrast, if classical swine fever or foot-and-mouth-disease broke out now, he/she suspects that 'it would be much more of a hassle to organize the response activities', as the last crises happened much longer ago.

2.7.7 Leadership, post-crisis evaluation reports and a shared sense-making

Remarkably, some concepts from the literature that we discussed as related to the crisis-induced learning process were not found to play a central role in the case of the NVWA. Experts do not explicitly emphasize the role of leadership in the learning process of the organization. An expert explains that he/she is not fully aware of the managers' role in the learning processes, because these take place at a different organizational level. A case that the experts identified in which the manager directly facilitated learning – by defending changes proposed by the NVIC at a higher organizational level – was considered more of a political–economic aspect. A plausible explanation for this finding might be related to the kind of organization studied, which we will discuss in the Section 7.

The role of public evaluation reports, published after every crisis and carried out by an external team of researchers, in the learning process is brought forward as ambiguous and limited. The experts explain that the external post-crisis evaluations to a large extent serve political purposes, which especially at the operational level is generally considered as opposed to learning. One expert explains that when an evaluation report is published, most learning in the organization has taken place already, and refers to the reports as 'too little, too late'. At the same time, higher managers and policy advisors used the evaluation reports as a 'checklist' to see whether important lessons have actually been picked up by the organization and to draw attention to issues at a higher – political – level, which can be necessary for achieving and legitimizing the larger changes. We saw that attempts had been made to learn from reports on different types of crises in other sectors, but this was experienced as rather difficult.

Finally, remarkably a shared sense-making of lessons to learn is not explicitly recognized by the experts as important in the learning process. At the same time, employees of the crisis management organization generally do have similar views on what lessons should be learned. The large shared understanding might be related to the strong external pressures on the organization from both the public, politics and the sector, the required technical expertise for the job and the largely executive tasks of the crisis management team. Within

the crisis organization, shared narratives of events and of lessons learned play some role in processes of communication and organizational memory. However, the large shared understanding in the crisis management organization could also be understood as creating a threat of group think.

2.8 CONCLUSION AND DISCUSSION

The concept of organizational learning is widely theorized and applied in academic research. In view of the increased attention for crisis management, it is remarkable that studies focusing on the conditions for learning in relation to crises have so far remained rather scarce. Previous research has shown that public sector organizations experience major difficulties with learning from crises (c.f. Smith *et al*., 2007; Stern, 1997; Deverell, 2009; Roux-Dufort, 2000; Elliott, 2009). In our study, we *explored* which factors drive organizational learning from crises. We applied a structured case study analysis to the Dutch food safety services' response to four veterinary crises, based on empirical data from in-depth interviews with key experts within the organization and of crisis management documents.

The NVWA has learned extensively from crises over the past two decades. Major lessons were learned in the areas of external communication, cooperation with other parties, work safety, organizational structure and routines, public safety and animal welfare. The study showed that organizational learning from crises is a highly complex process, in which many factors are at play that are often interrelated and of a very different nature. From the empirical data, we identified six key factors that drive organizational learning from crises: (1) political–economic context, (2) social–emotional understanding, (3) organizational culture, (4) organizational structure, (5) crisis management stage and (6) organizational forgetting. Remarkably, in this study, we did not find public post-crisis evaluation reports, leadership and a shared sense-making of lessons to learn to play a central role.

2.8.1 Discussion of factors

The first two factors political–economic context and social–emotional understanding lead in a direct way to the learning of tangible crisis lessons, although – in line with earlier findings (Broekema, 2016; Stern, 1997) – we found that in some instances, political pressure also blocked the implementation of lessons. This is important as political pressure is typical for public sector organizations. The factor social–emotional understanding fits in with crisis management literature on the role of psychological aspect such as stories, emotions and symbols (e.g., see 't Hart, 1993). While the first two factors are external initiators of learning, the next two factors identified are characteristics of the organization itself. Organizational culture and organizational structure function as fundamental conditions for facilitating learning within the organization, through enabling direct and positive relations in the

team, providing the necessary (professional) capacity and guiding learning behavior. The last two factors we identified are process-related. Being aware of the possible importance of the crisis management stage (Deverell, 2009; Moynihan, 2009), the data showed that it plays an ambiguous role. On the one hand, in the crisis response stage, there is the urge and pressure to (quickly) advance to adopting lessons. On the other hand, the organization needs the 'calm' periods in the revision stage to be able to thoroughly reflect on crisis events and implement larger organizational changes. Optimal for learning seems a balance between urgency and calm, and, paradoxically, a recurrence of similar crisis issues. Our findings support more a view of learning from crisis as a continuous process, rather than the idea that 'organizations responding to disasters learn in leaps – disaster by disaster – rather than smoothly over time' (Carley *et al.*, 1997, p. 107). Finally, we found that a process of organizational forgetting, observed by all experts interviewed without exception, plays a fundamental role in organizational learning in the longer term. The organization is in a constant struggle to prevent the outflow of expertise and to transfer knowledge to the right place within the organization. Surprisingly, the process of organizational forgetting is discussed only rarely in the literature (important exceptions are De Holan and Phillips, 2004; Argote, 2013) and studies that address it in a crisis management context seem to be absent. Organizational forgetting is closely related to processes of organizational memory and knowledge distribution (see Huber, 1991; Levitt *et al.*, 1988). Ironically, to improve its crisis management capabilities over the longer term, an organization seems to need crises happening.

Remarkably, three other factors that are prominent concepts in crisis management literature were not found to play a central role in the process of learning from crises in this study. The role of post-crisis evaluation reports in the organizational learning process was generally perceived as limited. In some cases, managers used the reports as a checklist for lessons learned and to legitimize changes at a political level. Our findings support the idea that public post-crisis evaluations largely serve political purposes (see Birkland, 2009; Elliott *et al.*, 2002). Furthermore, we saw that it is indeed challenging for organizations to adopt lessons from a different sector (Crichton *et al.*, 2009). A shared sense-making of what lessons to learn, although strongly present in the crisis management organization, was not explicitly brought forward as an important factor in the learning process. Shared narratives play some role in communicating and storing crisis lessons. One could argue that a large shared understanding creates a threat of group think, which limits a critical discussion of deviating information and viewpoints. Remarkably, contrary to what other studies suggest (e.g., Crossan *et al.*, 2011; Schein, 2010), in this study leadership was not explicitly brought forward as playing a central role in the learning process. This finding might be explained by the fact that the experts interviewed are part of a large executive agency, often working in

the field during a crisis, meaning that they often have limited insight into the managers' role in learning processes.

2.8.2 Challenges

This study faced two main challenges with regard to its validity. The dependent variable organizational learning remains difficult to grasp due to the many interpretations that circulate in the literature and the great complexity of the process. Defining learning in a different way, for example as mere acquirement of knowledge or as mere organizational changes, instead of a combination of the both, could generate completely different results. In addition, the concept of learning is inherently susceptible to normative and measurement problems (Birkland, 2006, p. 22; Carley and Harrald, 1997; Fiol *et al.*, 1985), due to the fact that its definition assumes increased 'effectiveness'.

This is problematic as goals in the public sector are often complex, diverse and ambiguous (Rainey, 2014). This applies even more to the context of a crisis, given the inherent political dynamics of the phenomenon (Boin *et al.*, 2005). We aimed to solve this challenge by to a large extent letting experts in the field indicate learning and so decrease a potential researcher bias. We are nonetheless aware – also because of a potential hindsight bias – that we did not 'measure' learning in a hard and irrefutable way.

A second challenge is the interrelatedness between factors that influence learning and their often ambivalent and indirect roles in the learning process, which creates a risk of oversimplification. The outcome of learning can be a factor that in turn influences further learning. The budget cut by the EU in 1998, for example, contributed to the founding of the NVIC and the creation of front teams. The NVIC and the front teams in turn provided learning routines and a capacity to actually be able to learn. The major reorganization in 2006 *indirectly* affected learning, as it was perceived by the experts as affecting the learning culture by reducing personal ties between people, which in turn influenced the distribution of expertise through the organization. Interestingly, organizational culture and structure can be factors that facilitate learning, but adjustments in culture and structure can also be outcomes of learning (see also Fiol *et al.*, 1985, pp. 804–805). Ambivalent factors, for example, are political pressure and crisis protocols, which were found to both facilitate and inhibit learning through different mechanisms.

2.8.3 Final remarks

Effective learning from crises is becoming increasingly relevant, given the rising trend in number and scope of crises globally. This study provides a framework to serve as a basis for further research on the subject. However, more empirical substantiation over more types of crises and organizations is needed to further build theory on organizational learning from crises. The generalizability of this study might be limited, as we studied one type of

organization facing one type of crisis only, which covered a relatively long time span. It would be interesting to, for example, study the role of leadership, post-crisis evaluations and shared sense-making of lessons to learn in other types of crises with different contexts. Furthermore, taking into account the complexity of the issue at hand, such studies should clearly distinguish in learning as a cognitive process, as an action process or as a combination of the two. Finally, we specifically recommend further study on the process of 'organizational forgetting' because, while receiving little attention in the literature, it plays a fundamental role in long-term organizational learning processes.

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