



## Revista Científica General José María Córdova

(Colombian Journal of Military and Strategic Studies)

Bogotá D.C., Colombia

ISSN 1900-6586 (print), 2500-7645 (online)

Journal homepage: <https://www.revistacientificaesmic.com>

## Managing network responsiveness in emergency preparedness supply chains for safety and security in developed nations

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**How to cite:** Kaneberg, E., Jensen, L-M., Hertz, S., (2020). Managing network responsiveness in emergency preparedness supply chains for safety and security in developed nations. *Revista Científica General José María Córdova*, 19(34), 453-477. <http://dx.doi.org/10.21830/19006586.735>

**Published online:** April 1, 2021

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**Revista Científica General José María Córdova**  
(Colombian Journal of Military and Strategic Studies)  
Bogotá D.C., Colombia

Volume 19, Number 34, April-June 2021, pp. 453-477  
<http://dx.doi.org/10.21830/19006586.735>

## Managing network responsiveness in emergency preparedness supply chains for safety and security in developed nations

Gestión de la capacidad de respuesta de cadenas de suministro y preparación en emergencias para la seguridad y protección en países desarrollados

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**ABSTRACT.** Supply chains can play a major role in reducing countries' safety and security threats; the role of network responsiveness offers insights into management exchanges responding to the preparedness of developed countries like Sweden. Illustrating the managing of overall supply chain capabilities among network responsiveness stems from the supply chain responsiveness concept. Several challenges to responsiveness prevent actors' networks from fully benefitting from coordination. A management approach is employed to explore the impact of network responsiveness on the supply chain as an overarching strategy for safety and security. The study suggests three different approaches which differ in their impact on the network's responsiveness: (i) an overall strategic planning approach, (ii) one integrated system approach for the overall response, and (iii) a coordination approach for managing the overall supply chain responsiveness strategy.

**KEYWORDS:** developed countries; emergency preparedness; network responsiveness; safety and security; supply chain management

**RESUMEN.** Las cadenas de suministro pueden desempeñar un rol importante en la reducción de amenazas a la seguridad y protección de países desarrollados, como Suecia. Este artículo ofrece perspectivas acerca de la cadena de suministro y deriva del concepto de preparación para emergencias. Varios desafíos impiden que las redes de actores se beneficien plenamente de la coordinación. El estudio enfoca el impacto de las redes de actores en la cadena de suministro como una estrategia general para el manejo de la seguridad. Tres enfoques difieren en su impacto en la capacidad de las redes de actores envueltos; (i) un enfoque de planificación estratégica general, (ii) un enfoque de sistema integrado para la respuesta general, (iii) un enfoque de coordinación para gestionar la estrategia general de capacidad en respuesta a la cadena de suministro.

**PALABRAS CLAVE:** gestión de cadena de suministro; países desarrollados; preparación de emergencias; red de sensibilidad; seguridad y protección

Section: INTELLIGENCE AND LOGISTICS • Technological and scientific research article

Received: November 2, 2020 • Accepted: February 2, 2021

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## Introduction

Network responsiveness represents one major tendency impacting societies' preparedness for terror attacks, pandemics, political and economic instability, and the effects of climate change (Beamon and Balcik, 2008; Micheletti, 2019; Shaftoe, 2012; Barton, 2000). Its disruptive effect on supply chains is not yet fully recognized. While critics claim that network responsiveness will disturb the management of major challenges, others point at its potential to swiftly respond to all types of complex emergencies (L'Hermitte et al., 2016). An important advantage of network responsiveness is the potential to enable preparedness (Jahre & Fabbe-Costes, 2015; Kovacs & Spens, 2007; Kaneberg, 2017) along with the two dimensions comprising the safety and security of civil societies (Kaldor, 2001). Safety and security have become increasingly important for developed countries to consider more so because of new and unpredicted demands. For instance, Sweden, which is highly ranked among the top developed countries due to its stability, is still very much concerned with avoiding non-responsive systems and inefficient use of resources (Kaneberg, 2018; Boin & McConnell, 2007).

This increasing demand for network responsiveness represents challenges for the emergency preparedness systems (Closs & McGarrell, 2004; Kaneberg et al., 2016). In responding to the global COVID-19 pandemic, Swedish response management became critical (e.g., Bouvin et al., 2020). Shortages of medical logistics and coordination of resources in emergency management are characterized by responsiveness inability (c.f. Kim et al., 2013). Specific shortages that affect responsiveness can be skilled public workers, monetary assets, medicines, transportation, and information (cf. L'Hermitte et al., 2016). Responsiveness can be defined as the "ability of actors in the supply chain to satisfy customers' needs" (Kim et al., 2013, p. 5602). These actors are part of different networks in civil society, whether in the same or across countries' safety and security (Alexander, 2006). The civil society describes it as "the trusted channels through which social agreements between the state and organizations are negotiated and reproduced" (Kaldor, 2001, p. 44). Thus, it strongly contributes to developed countries' overall negotiations, as these are "rich democracies that have devoted substantial national resources to welfare provision" (Swank, 2002, p. 68). Here, network responsiveness can have a major impact, with the potential to provide safety and security to defend against complex threats and political uncertainty (Johansson & Westerberg, 2019). The hope is that network responsiveness could improve the response management to "cross-scale interactions" (Peters et al., 2004, p. 65) for dealing with unpredictable "jumps" between different managerial levels (Strömberg, 2015).

This article explores both academics and practitioners' results (Ghosh et al., 2014) on managers ability to prepare and respond to all-hazards, "a main approach used by

developed countries to meet and structure the planning of all types of hazards, including war” (Boin & McConnell, 2007, p. 37). This approach has been used in different countries such as Canada and Australia. Hazards are inherently unpredictable, and with the rapid rise of complexity, they challenge supply chains in achieving responsiveness (Kim et al., 2013). The underlying challenge is the management of the network rather than the supply chain.

This study explores the impact of networks’ responsiveness on supply chains and the management of safety and security through the responsiveness of developed countries’ emergency preparedness systems. The study will address two questions: (1) What are the main challenges in emergency preparedness for ensuring the responsiveness of networks in supply chains supporting the safety and security of developed countries? (2) How can the supply chain be developed to achieve better responsiveness, impacting the safety and security of countries through their emergency preparedness systems’ responsiveness?

The paper is structured in 6 sections. This introduction provides a broad overview of the challenges of responsiveness for developed countries and ends with the research questions. In section 2, we review the literature on supply chain responsiveness in relation to safety and security as a broad background for the study. Section 3 describes our inductive approach to the case. Section 4 presents the general and specific results of the case. Section 5 provides the analysis and our propositions, and Section 6 presents the overall conclusions of the paper.

## Literature

### Responsiveness and supply chain challenges

Responsiveness in emergency preparedness is a perspective that, according to Kaneberg et al. (2016), needs to involve all actors in civil society. The previous has considerable relevance when considering a more comprehensive system for safety and security that considers the actors in the supply chain networks (Kaneberg, 2018). In business networks, responsiveness helps increase transparency in strategic planning, decreasing the impact of failures and unnecessary costs in emergency responses (Richey et al., 2009, p. 453). From the extant literature, this article identifies five main challenges relevant to responsiveness.

A first challenge to the emergency preparedness system concerns the management of strategic capability, through which actors’ responsiveness can be achieved in networks (Kaneberg, 2018). Given that organizations are linked in supply chains, they can create synergies. They can also improve their internal efficiency (Vaillancourt, 2016) by maximizing the value of operations (Beamon & Kotleba, 2006) and balancing responsiveness vs. efficiency (Altay et al., 2009; Gunasekaran et al., 2008). Concerning safety and security, they can move faster to deliver as planned and prepare responsive solutions to address uncertainty.

A second challenge involves the time horizons of typical responses, in which the supply chain network engages under somewhat unpredictable conditions (Pettit & Beresford, 2009). Trends, such as responsiveness (Kim & Lee, 2010) and efficiency (Tatham & Pettit, 2010), are associated with the management of supply chain disruptions. Kim et al. (2013, p. 5602) claim that “responsiveness can impact the ability of actors in the supply chain to satisfy customers’ needs.” Here, responsiveness is defined “[...] as the ability to respond and adapt [...] effectively based on the ability to [...] understand actual [...] signals” (Catalan and Kotzab, 2003, p. 677) in response to changing threats and extreme demands.

A third challenge pertains to the impact of network responsiveness on activities in the systems, which requires well-trained and experienced management able to handle response actions (Kaneberg, 2018). This challenge in emergency preparedness is affected by substantial inertia. However, typically due to misunderstood mandates and perceived limitations in certain areas of control, responsibility can become highly unclear when actors are required to move from one level of responsibility to the next (Kaneberg et al., 2017).

A fourth challenge is particularly relevant to developed countries and how these countries’ substantial resources can be more accurately targeted to increase their networks’ responsiveness. This network responsiveness in emergency preparedness is often a major challenge (Kaneberg, 2018). However, it is typically only addressed concerning the emergency system in general terms and only rarely applied to supply chains (Tatham et al., 2010). The demand for actors’ skills and understanding, authority, and decision-making regarding national and international responsibilities is constantly increasing (Paris, 2004, p.10). With an augmented demand for “supply chain managers” to address network responsiveness, the managers’ commitment is also required to deal with strategy developments (Tatham et al., 2010). Thus, a supply chain can no longer only prioritize financial performance and operational results (L’Hermitte et al., 2016). It also needs to consider the multifaceted nature of network responsiveness, summarized as “strategic competences” for building supply chains (Mangan & Christopher, 2005, p. 180).

A fifth challenge concerns the actor’s short-term focus on efficiency to reduce preparation costs, significantly impacting the long-term network responsiveness (Kaneberg et al., 2017). The potential of reducing costs, especially labor costs, and improving internal efficiency, for instance, through better use of resources and activities in short-term deliveries, are major actor-engaging motivations (Van Wassenhove, 2006), thereby improving the response to a crisis (Kovács and Spens, 2007). However, several different networks need to be linked to supply chains in the long term to increase efficiency. As this study will demonstrate, these prerequisites are typically perceived to positively impact the different long-term relations for the network’s responsiveness. For example, tradeoffs between

supply chains are often a way of increasing supply chain responsiveness (L'Hermitte et al., 2016; Day et al., 2012). This supply chain responsiveness aims to overcome redundancies and the uncertainty implicit in managing different type of actors (Beamon & Kotleba 2006; Beamon, 2004). Network responsiveness can profoundly improve countries' preparedness systems' safety and security (L'Hermitte et al., 2016; Kaneberg, 2018). It also has the potential to improve management efficiency and increase capacity through coordinated planning and mutual use of societal resources, as well as improve responders' labor safety conditions (Kovács & Tatham, 2009; Qrunfleh & Tarafdar, 2013).

### *An integrated system for an all-hazards approach planning*

Overall planning is a component that, according to Kaneberg et al. (2016), involves actors, resources, and activities. The integration of these elements into civil and military systems requires an all-hazards approach (AHA). Kaneberg's (2018) study on integrating planning elements in networks involve actor's networks responsiveness to meet the changing demands, as the network must be integrated to mitigate complex hazards (Peters et al., 2004; Tranvik et al., 2009). Integrating threats in AHA is an approach for mitigating the effects of complex emergencies that can disturb vital infrastructures. A country's safety and security systems and technology systems are often interrelated and unable to promptly detect advanced threats to such infrastructures.

Emergency preparedness involves different management portfolios (civil and military) associated with emergency response and reconstruction (Van Wassenhove, 2006). Emergency preparedness refers to "the long-term planning of activities to strengthen the overall capacity and capability of a country" to efficiently respond to all types of hazards in civil society (WHO, 2007, p. 8). Developed countries have been trying to adapt not only to rapid global changes but also in terms of complex hazards, so far, with limited success (Boin & McConnell, 2007; Cornwall, 2005). A core issue is the time needed to understand how safety and security changes impact societies (e.g., Kaldor, 2013; WHO, 2007). In the supply chain, "actors do not exist in a vacuum but are always connected to other actors" (Axelsson & Easton, 1992, p. 120). Thus, the networks and the actors' role in safety and security are embedded in goals encouraging governments to ensure their strategies dealing with network disruptions (Bhalla & Lapeyre, 2016). Mapping the actors involved in the supply chains, as well as their resources, would significantly simplify the work of emergency managers (Qrunfleh & Tarafdar, 2013). Kaneberg et al. (2019) argue that network responsiveness is directly linked to the effectiveness of coordination. Jensen and Hertz (2016) specifically suggest that developing clearer roles before an emergency occurs reduces the amount of coordination needed during the response, leading to better performance. On the other hand, the challenge of achieving responsiveness is incalculably more difficult given the expected disruption of communication and information (Smith, 2005). However, as mentioned, the network's structures can be modified to support the

systems' preparedness by integrating actors, processes, operations, resources, and skills in the supply chains (Larson, 2012; Kovács & Tatham, 2009).

A common theme in safety and security is civil defense (CD), as a component of countries' systems, grounded in policies associated with responding to complex emergencies depending on the type of threat (Nielsen & Snider, 2009). CD was born out of war-time and attempted to plan activities for civilian protection (Alexander, 2005). CD has been defined by, for example, Alexander (2002) as the planning to reallocate the civilian population in the face of actual or potential aggression. CD is managed by a combination of military and civil authorities, building on doctrines and regulations. Nielsen and Snider (2009, p. 247) argue that CD is "an effective model to develop civil-military relations." One of CD's functions is to enhance the role of preparedness to address countries' uncertain national safety and security (Nielsen, 2011; Rietjens, 2006). However, because plans and strategies are to be kept secret from an assumed enemy power, CD planning is not usually subject to rules of accountability and freedom of information (Nielsen, 2002).

Kaldor (2013) claims that, in war, CD can essentially be associated with security. It can be a network characterized to reduce the violation of civil freedom and reduce costs, destruction, and uncertain protection. Cohen (2007, pp. 37-38) argues that civil society has "become global," targeting democratization and integration but no longer the state; instead, it targets the emerging, complex global order. Most differences in countries' preparedness systems, linked to complex global order, are grounded in social and economic progress. Nielsen (2011) classifies countries in various ways; the most well-known example is the distinction between developing and developed countries. In Nielsen's view, developed countries are classified by criteria such as per capita income, market access, and level of vulnerability. Critiques to CD entail significant consequences for civilian-military relations (Nielsen & Snider, 2009) and the ability to survive significant disagreements, which requires actors to be flexible when resolving ambiguities and conflicts (Kleindorfer & Saad, 2005). Civil-military relations are central to planning but are often affected by policy orientation, information availability, and communication (Nielsen, 2011; Smith, 2007).

### *The coordination of actors in all-hazard planning*

Benefiting from the all-hazard preparedness planning in developed countries, according to Nielsen (2011), is a considerable challenge for successfully applying policies that cover the level of uncertainty within countries and the uncertainty that exists across borders. Civil-military relations are a coordination challenge in emergency planning (Alexander, 2002; 2005; Salamon & Sokolowski 2001). The management of these challenges, according to Kaneberg (2017), is also "necessary to respond effectively to complex emergencies and to mitigate the threats to developed countries" (Kaneberg, 2017, p. 350). Given the challenge of achieving supply chain efficiency, a major aspect of network responsiveness is

the actors' ability to coordinate by integrating their resources (Catalan and Kotzab, 2003). Thus, planning management has generated requirements for coordinating actors based on their capabilities to meet the safety and security needs (Altay et al., 2009; Tomasini & Van Wassenhove, 2009; Altay, 2006).

## Method

To understand the impact of network responsiveness on supply chains within emergency preparedness, we designed an explorative case study. We approached this through an in-depth study of the Swedish system because of the networks' challenge to achieve responsiveness in complex supply chains. This required rich data and implied a context of discovery. While some general problems have been defined in the literature, we needed to go beyond these and look at the views of different actors in the network to see the different potentially interacting levels. A case study was selected to support both a better overall understanding and the emergence of "active data" (Mackay, 1992, p. 531). The Swedish case was seen as representative despite some special features due to the Swedish system's changes over the last few years, not least in its distinctive civil defense and emergency preparedness systems.

We followed a broadly inductive approach in which we focused on challenging responsiveness-related areas identified from the literature. We showed how the literature has addressed the challenges in general terms but then used the case to illustrate specifics and formulate propositions regarding both the challenges and solutions. The literature was used to provide a narrative review within the main areas based on the authors' experience in the research field. Access to senior managers and expert witnesses makes this approach more valuable because these interviewees offer considerable know-how and insight into the Swedish system. The data was strengthened by triangulation, as "the [...] reviewing of data collected through different methods in order to achieve a more accurate and valid estimate of qualitative results for a particular construct" (Oliver-Hoyo & Allen, 2006). The data was triangulated in several ways, both in terms of different types of actors in the system and through combining interviews, workshops, and secondary data to provide better support in addressing the different points of view (Creswell, 2011).

Numerous documents were analyzed, including articles, books, studies, policy documents, analyses, reports, newspapers, military doctrines, and readings from official websites. One of the authors also attended a set of four seminars on antagonistic threats, risk management, and security and strategy at the Institute for National Defense and Security Policy Studies (IHT) on the 4<sup>th</sup> and 5<sup>th</sup> of April 2017. These seminars contributed to our overall understanding of the rapidly changing conditions in Sweden. These views contributed to maximizing the reliability and validity of measurements in this study when using

the *social research methods* proposed by Bryman (2015, p. 3-12). Based on Bryman's view of social research methods, we argued that the role of our theory is to make a connection to social research. We used the theoretical frame of supply chain network responsiveness in connection with emergency preparedness demands to support societies' safety and security. Numerous documents were analyzed, including articles, books, studies, policy documents, analyses, reports, newspapers, military doctrines, and readings from official websites. For this study, these views contributed to maximizing the reliability and validity measurements when using the "social research methods" proposed by Bryman (2015, p. 3-12). Based on Bryman's view of social research methods, we argue that the role of our theory is to make a connection to social research, we use the theoretical frame of supply chain network responsiveness in connection with emergency preparedness demands to support the safety and security of societies. Our interview questions were motivated to ensure not only the right procedures (through research methods) and respond to the choices available to us at the time.

The respondents were able to add new issues to the chosen themes and discuss the Swedish system (Table 1). The unit of analysis was network responsiveness and its resulting goals, methods, and means. As they are produced in coordination among and between the supply chain, these are pillars of the Swedish government's emergency preparedness system. Interviews were conducted with managers and several other specialists in the strategy, safety and security, threats, risk management, supply management, and emergency management fields. Selection resulted in 24 interviewees (each interview 1-2 hours). Respondents were selected by carefully estimating their involvement and expertise in public, private, political, and commercial organizations involved in emergency preparedness in Swedish academic, managerial, and practitioner roles covering the study's specific focus.

**Table 1.** Areas in which interview questions were provided.

<b>Focus areas (based on the Swedish example)</b>	<b>Examples of the types of questions included in each focus area</b>
1. On the background, experience, and affiliation of respondents and their organizational role in the Swedish setting (set of four questions).	What is the role, years of experience, and affiliation of the respondent? What is the organization's role and area in the emergency preparedness system?
2. On general views of the threats to Sweden in peacetime and the actors that need to coordinate (set of five questions).	What is the threat scenario in Sweden today? What actors in Sweden need to be coordinated to avoid fragmentation of the threat scenario?

Table continues...

<b>Focus areas (based on the Swedish example)</b>	<b>Examples of the types of questions included in each focus area</b>
3. On emergency preparedness and civil defense, planning, strategies, responses, and reconstructions (set of five questions).	What are some of the main challenges and solutions to the current system? How can they be addressed in planning?
4. On the supply chain and coordination of actors (set of five questions).	What are some of the main challenges and solutions to the current supply chains? How can they be addressed in safety and security?
5. On additional thoughts, themes, and ideas	What are the overall views, challenges, and explanations?

Source: Created by the authors.

Represented respondents were from the Swedish Defense College (FHS), Södertörns Högskola (SHS), the Swedish Armed Forces (SAF), the Swedish Contingencies Agency (MSB), the Swedish Defense Materiel Administration (FMV), the Swedish Polis (NOA), the Swedish Research Institute of Industrial Economics (SNL), Swedish Customs (TV), the Government Office of Sweden (GOS), and the Swedish Defense Research Agency (FOI). The collected data grouped respondents into broader categories rather than listing interviews specifically (commercial, military, voluntary, political, private) to meet anonymity requirements. Notes and recorded materials were collected based on the structure showed in Table 2. The interview guide was provided to the interviewees in advance.

**Table 2.** Classification of the collected data.

<b>Group</b>	<b>Number</b>	<b>Field</b>	<b>Levels</b>	<b>Organizations</b>	<b>Hrs.</b>
A	5	Academic	e.g., professors, instructors, researchers	FHS-SHS-FOI	6
B	7	Managerial	e.g., top, middle, civil, and military managers	SAF-FMV-MSB-NOA-GOS	10
C	5	Practical	e.g., preparedness experts, safety, security, policy experts	TV-FMV-SNL	6
D	3	Managerial	e.g., experts in public procurement act	Gartner/Kvadrat	6
E	4	Seminars	e.g., practitioners and civil-military experts	FHS-SAF-MSB-TV	12
<b>Overall, 24 person-to-person semi-structured interviews and a total time of 40 hours</b>					
F	Diverse materials	Operational academic	e.g., articles, books, studies, policies, analyses, reports, webpages	SAF-FMV-MSB-NOA	20

Source: Created by the authors.

Interviews were recorded and transcribed (with one exception, where the interview record consisted of handwritten notes). Quotes were translated to English where needed. The transcribed interviews were reviewed, and based on the literature review, relevant quotes and statements, specific problems, and possible solutions views from interviewees were extracted. In the second round of analysis, these disparate summaries were merged to reflect a set of main contents matching theoretical overlaps between the five challenges in the case. This stage is summarized in Table 3 and provides a basis for our analysis. This study followed the guidelines of Guba and Lincoln (1994) to guarantee the quality of the research. It is appropriate for qualitative and interpretative research, namely credibility, transferability, dependability, and confirmability.

### **Swedish safety and security**

Sweden's National Security Strategy (2017) is more dependent on the outside world than ever before. In the long-term, the adoption of globalization has clearly had positive effects, both on Sweden's standard of living and its security. Globalization has also contributed to the diversity that currently characterizes Swedish society and connects to both economic growth and openness. It allows Sweden to build prosperity, safety, and security jointly. However, this strategic policy needs to address essential questions of long-term planning rather than encourage profitable a short-run culture (Trägårdh, 2007). It is argued that security issues should be considered from a much broader perspective than considered previously. Although this remains a core mission for the state, security for Sweden residents is not merely about preparing to face military threats and armed attacks but to ensure wider security. This view must also include protection against epidemics and infectious diseases, the fight against terrorism and organized crime, the provision of safe transport and a reliable food supply, protection against interruptions in energy supplies, actions to counter devastating climate change, efforts towards peace and global development, and more. These views have been expressed earlier by authors such as Olson (1990). Accordingly, Sweden's civil society has worked for peace and democracy for more than fifty years. Peace and democracy are ideas that are built into the country's cooperative activities (Olson, 1990, pp. 3-4).

This broad concept of security has been the starting point for the Government Security Policy Council's work to support Sweden's success in the areas of safety and security and consider a larger political space for civil society actors. It is also the basis for the government-established national security strategy. Strategic planning is actually considered in broader management and therefore addresses the highest level of preparedness. By contracting out its public service provision to the private sector, Sweden has stimulated business relations in strategic planning among actors (Christensen & Laegreid, 2001).

This approach influences central areas and social functions, which were previously mainly under the state's responsibilities. However, currently, they can be shared by many different actors. As a result of globalization, the relationship between internal and external security is more direct and short-term than it used to be.

An analysis on the management of emergency preparedness on the Swedish Contingencies Agency's (MSB) website, [www.msb.se](http://www.msb.se), claims that decision-making results affecting the management of complex emergencies are affected by "value-inertia." "Value inertia was argued to be the tendency for values of decision-making to influence the results of experts judgment" (MSB report, 2019, p. 21). Therefore, MSB actors should ask whether the values that affected their risk assessment are appropriate for integrating relevant networks into the supply chain for resolving Sweden's safety and security requirements. Integrating small businesses or municipalities as actors, for instance, into established networks could contribute to their planning and coordination of other actors' capabilities to address all types of emergencies.

### **Threats in peacetime**

Sweden requires the development of a system to respond to any hazard, but due to excessive bureaucracy, the Swedish model is unreliable to new and unexpected difficulties. This view seems to be commonly shared by some of our interview respondents, which stated:

[...] the cooperation within Swedish preparedness has improved over the last few years between civil authorities and military organizations, for example, after the terror attacks in Stockholm 2017. So far, however, it is insufficient. The system must be modernized and made more effective (Groups A and B).

The Swedish planning for forest fires in 2018 started on May 25th and continued for weeks. The responses were inadequate at several levels; this led to substantial material damage and the evacuation of the local population (Johansson & Westerberg, 2019). The respondents' answers appear to agree on the opinion that

(...) deficiencies in Swedish preparedness became all too obvious during the great Västmanland forest fires in 2014 and repeated forest fires in 2018. In part, the crisis response was chaotic and became an eye-opener for the type of preparedness really needed in a crisis (Groups E and F).

Sweden is well structured, yet it cannot ensure safety and security efficiently. The threat of war required that civil society be organized differently. According to the compiled respondents' views in Group B,

Swedish security is integrated with basic values, but the threat scenario becomes fragmented. Democracy must be defended and the rule of law promoted, maintaining

respect for the rights and freedoms of every resident against all internal and external actors who may want to undermine them. These values have an indispensable intrinsic value. They form an essential choice for the society's prosperity and flexibility.

Emergency planning can be developed with an emphasis on civilian-military coordination, known as civil defense, to develop the particularities of different response demands (MSB, 2009). In this regard, our respondents in Group A concluded that

[...] the challenges to Swedish security are complex and can change quickly. At the same time, the conditions for protecting the population and maintaining the most important social functions have fundamentally changed. The actors that are important for the safety of society are not only more than before but also more diversified.

### **Emergency preparedness responsiveness**

On November 24th, 2016, the Swedish Government asked the MSB to submit the basis of its work on the next defense strategy. In parallel, the Swedish government instructed the Swedish Armed Forces and the FOI to provide international defense and security strategy conditions relevant to the defense strategy. On this, the views from respondents in Group E concurred that the MSB is responsible to the government to examine authorities' capability and report their progress on civil defense planning within their own area of responsibility. According to the MSB, initiating civil defense planning is another strategy of Swedish readiness, which focuses on maintaining and developing preparedness at a reasonable level to cope with the worst possible threats to society, such as war.

Safety and security trends in Swedish society are privatization and more individualization, as well as fragmentation, urbanization, and digitalization. Summing up Group B's viewpoints, seemingly, several of these trends are global and strong in many developed countries. They claim that the overall ability of the country to prevent, resist, and manage crises and wars must be strengthened, applying to both short-term challenges and longer-term threats.

Sweden has worked extensively to provide protection and security for the population and create efficient and effective emergency preparedness. Respondents in Group E seem to agree that

[...] health services, transport, communication, and the food industry are examples of different supply chain networks necessary to support preparedness planning. However, the different actors involved in part of the national planning need to be coordinated to meet demands more quickly in stressed circumstances.

The Swedish emergency preparedness is a solid foundation intended to provide a safe and well-functioning society. Yet security demands are claiming a holistic approach

and collaboration between different actors and policy areas. In general, respondents in Group C believe that

Sweden cannot ignore that emergency preparedness may need to be utilized on short notice. (...) Buyers' and suppliers' roles in the supply chain have changed in terms of increased pressure in operations. (...) the goal is that important civil society actors need to maintain preparedness, even during warfare (...) this is difficult to achieve. In addition, support may be given to the military defense. However, the continued work on these abilities must be based on a realistic view of today's society (...) how it can be expected to develop is a future issue.

Emergency preparedness managers expressed opinions that civil defense is a system that has the potential to coordinate all actors and resources. The summary of Groups C and D's responses presents a deviating view that does not appear to include military planning. They argue that

[...] to achieve the previous, civil defense coordination between the Swedish actors must be improved radically. There cannot be two preparedness systems, one civil and one military, with poor links between them. For example, the MSB, the Swedish Civil Contingencies Agency, and the Swedish Armed Forces are under different government departments.

The establishment of the new civil defense system in Sweden redirects traditional emergency preparedness to planning for both the civil and military systems. Groups B and E seem to agree that civil defense managers are required to develop an overall (ONE) system in which all society's actors and their resources are coordinated and integrated to share the same goals, that is, safety and security. One of the responses stated that there were plans during the Cold War for how the larger cities, including Stockholm, could be accommodated. Those plans may already have been difficult to implement in a real state; a corresponding plan today seems even less realistic.

Sweden must be able to confront a variety of challenges that range from antagonistic threats to war. Groups C and D seem to agree that living in between phases of peace and war involves new types of complex situations, more so than before. They used as an example an extensive cyber-attack on society, which would be an event in the "grey zone," between peace and war. According to Group A and C, a perceived view is that the Swedish system should include all types of threats in an "all-hazards" approach to planning that must guide how different actors in society are involved in different supply and preparedness networks. The previous was represented in the following statement: The civilian and voluntary actors should be coordinated. There should be a well-functioning plan B and plan C, and excessive thinking should not be necessary once the systems are put to the test.

The changing security policy situation in Europe is forcing Swedish society to confront a variety of unforeseen challenges, such as disinformation campaigns, warfare, terrorism, and cybersecurity. Groups A and C believe that this creates an increasingly differentiated picture of future risks (threats), which place increased demands on society's ability to achieve security and safety goals through emergency preparedness and civil defense.

### **The supply chain and the coordination of actor-networks**

According to Group F's respondents, a common view is that if the preparedness and security efforts within their respective areas are to succeed, public actors must have a designated responsibility for the overall tasks of risk analysis. The general view is that

Because business actors are also key players, controlling a large part of the resources crucial for society's functionality, significant coordination efforts are necessary. Ultimately, Sweden's security depends on each resident's will and ability to take responsibility for their own and society's security and preparedness.

In seminars, experts promoted the continued development of action plans and a modern and coherent overall defense plan. Building on risk analysis in aggregate, a strong intelligence capability, in both police and defense, along with a well-equipped psychological defense, are essential components of Sweden's security. The views of respondents in Group E seem to agree that

The continued expansion of complex threats, preparedness issues, and military involvement is more than sufficient motivation to reconstruct civil defense to reinforce civil-military relations mutually. Civil defense is basically equivalent to society's inherent robustness and ability to handle heightened preparedness, the threat of war, and war.

### **Additional themes**

Civil defense must safeguard the civilian population, secure the most important social functions, and contribute to the armed forces' ability during an armed attack or war. In this regard, Group E responded that a general problem is integrating specific skills and flows and how to secure essential capabilities to those flows in an emergency.

Looking at risk analysis, this is highly dependent on trade with the rest of the world, especially for a country such as Sweden, whose exports correspond to approximately fifty percent of the GDP. The opinions of Group E seem to concur in that that

[...] there is a need for long-term security. History shows that a vicious cycle of protectionist and isolationist measures can negatively impact international peace and security. The Swedish interest is that the EU follows a free-trade policy agenda. The World Trade Organization (WTO) forms the basis for international cooperation in the field of trade.

Several trends in Swedish society are, however, highlighted in the context of civil defense. According to the respondents in Group E, strategically, the civil defense system in Sweden focuses on maintaining and developing preparedness to cope with society's worst possible threats, such as war.

## Analysis

This section analyzes the responses in terms of the two research questions, ending with three propositions.

### Research Question 1

*What are the main challenges in emergency preparedness for ensuring the responsiveness of actor networks in supply chains supporting the safety and security of developed countries?*

Respondents noted that Sweden's current system is suitable for adapting to short-term threats but may have to be organized differently to connect to a broader and changing range and complexity of threats. This is particularly the case when considering different response levels (national, regional, and local). There is a need for both civil-military coordination and consideration of the entire range of hazards (an all-hazards approach). The features of the Swedish system –its separate emergency response and civil defense systems– create additional coordination challenges. According to senior military managers and hands-on practitioners, there is a lack of clarity in coordinating civil defense planning. The MSB's authority is undefined, and its responsibilities seem to overlap with those of county boards. Kaneberg (2018) points out a lack of clear authority to reduce inefficient use of the involved actors in the supply chain in response operations.

Respondents also stated that it is challenging for actors to switch rapidly between different levels and forms of authority. Different actor-type combinations are clearly challenging, given that they need to make substantial switches in the relevant authority-types while the role of the main coordinating actor is unclear. Emergency planning requires that all actors meet their responsibilities, focusing on their responsiveness in operational responses (Kaneberg et al., 2016). One of the main issues regarding CD is that recommendations from earlier experiences are not followed up, and the responsible parties for doing so are unclear. As Van Wassenhove and Tomasini (2009) stated, the incorporation of earlier experiences is a crucial component for improving the coordination and capability of actors.

A second issue is that the CD systems were well suited for a Cold War reality, but many of the plans are currently obsolete or difficult to implement within the current context. The overall supply chain's efficiency has been shown to be affected by uncertainties (L'Hermitte et al., 2016) and actors' indistinct roles. Should these change, the appropri-

ate response can also change. It is reasonable to assume that without constant updates, the systems become inadequate over time. An evident challenge to the functioning of response supply chains is that many actors do not fully participate due to insufficient information flows. According to Smith (2005), information exchange is essential to avoid substantial problems in the response, for instance, when civil-military organizations are working together. A related issue is the risk that the information falls into the wrong hands, exposing the supply chain to various types of sabotage. Explicitly, the employed information systems have shown weaknesses in more complex contexts.

A final and critical challenge to supply chain networks is the lack of connections between different organizations and their planning systems and management approaches that create deficiencies in planning, communication, and coordination. If responsiveness depends on the ability to understand signals (Catalan & Kotzab, 2003), then the systems themselves make it more difficult, not easier, to achieve responsiveness.

A central issue is that the safety and security strategy is built on two parallel systems that are not truly coordinated. Several structures exist that obtain instructions independently in response to different policies. Considering civil defense to enhance preparedness, its purpose to the safety and security is unclear (Nielsen, 2011; Nielsen & Snider, 2009). We can say that CD's fundamental premise matches the idea of a single system; however, the way it is implemented in practice does not.

**Table 3:** Challenges in the literature and the case.

<b>Difference between research and practice</b>	
<b>Literature</b>	<b>Case</b>
How to manage the system at a strategic level to achieve responsiveness from both actors.	The system works well for short-term threats but not for longer-term (especially complex) threats.
Short time horizon with unpredictable conditions, however, long-term relations are essential for responsiveness	Lack of clarity in terms of coordination of the civil defense planning.
Managerial actions, limits, and leadership inertia.	Hard to switch between different levels of responsibility.
Mobilize substantial resources for improving network responsiveness as a strategic competence.	Insufficient organizational and network-level learning.
Focus on cost efficiency can have consequences for network responsiveness.	Obsolete planning processes and environmental uncertainty.

Table continues...

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### Difference between research and practice

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Literature	Case
	Actors do not fully participate due to information flow issues.
	Lack of linkages between organizations and their planning makes the network less responsive.
	Safety and security build on two different systems that are not coordinated.

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Source: Created by the authors.

There are considerable overlaps between the five challenges identified in the literature and the challenges in the cases. Notably, the basic challenges of low predictability and managerial challenges related to organizational limits and delimitations are significant. In the Swedish case, this is further specified as being related to restrictions in the information flow, where important actors are not necessarily part of the planning process. In this case, the specific challenge is that the two safety and security systems create a greater division between the actors and make it harder to respond as a single supply chain network. Indeed, in part, the civil defense system is based on old sets of plans that are difficult to update for a contemporary context. The additional consequence is organized in terms of organizational learning at the “network-level,” that is, the network only partially learns lessons from previous responses. We say that the resources are substantial, but they are not necessarily developed in the right direction; actors gain experience but do not share it among them. The activities carried out are not sufficiently coordinated in an overall sense.

## Research Question 2

*How can the supply chain develop to achieve better responsiveness, impacting the safety and security of countries through their emergency preparedness systems responsiveness?*

The challenges identified indicate that many factors potentially reduce both the responsiveness and efficiency of the supply chain when dealing with a broad range of threats. The solutions can only come at the system or supply chain network level because this is where the response is implemented.

The empirical section demonstrated that the Swedish system’s current strategic focus on safety and security entails significant challenges involving all the relevant actors and their capabilities. A clear opinion from the respondents is that all the relevant actors should participate in the planning phase. With the supply chain logic, all participants must be aware of the customers/recipients. Using supply chain thinking as a basis for

planning and integrating actors in networks has already been suggested as a solution to achieve responsiveness (Axelsson & Easton, 1992). A second recommendation is that the roles of different actors be clarified; this would reduce the amount of coordination required for the response (Jensen & Hertz, 2016). The development of such roles requires time and effort during the preparation phase. However, it can potentially lead to improving the response in terms of both responsiveness and efficiency.

Thus far, safety and security strategies have not focused much on overall coordination. Planning coordination needs to take place among all the actors and resources that provide products and services in the supply chain, for instance, between providers of emergency supplies, such as food, water, and medical solutions, and those that ensure the safety of vital infrastructures (Nielsen, 2011). Responsiveness is related to the overall strategy because it is established through the actors' coordination and knowledge and the efficiency that links resources to the supply chain (Jensen & Hertz, 2016; Larson, 2012). An overall strategic approach is a vital foundation for planning because it involves vital infrastructures, actors, and the management of responses.

The first proposition builds directly on the argument above.

*P.1. An overall strategic planning approach that enables the efficient functioning of the system requires that all relevant actors be involved because their joint resources are critical to achieving responsive safety and security strategy goals.*

The other major issue is the need for an integrated system for all types of emergencies, in other words, a system capable of dealing with all possible hazards, like AHA. According to the literature, the main outcome of an integrated system is the coordination of the different areas of a supply chain for overall efficiency and improved actor's responsiveness by managing all involved actors (civil, military, voluntary, and commercial) in their shared focus on final requirements (L'Hermitte et al., 2016, Kovács & Spens, 2007, van Wassenhove, 2006). In the Swedish system, safety and security demands are generated in national standards. The integration of planning elements among actors to secure capacity is essential, for example, in the form of civil and military resources. Thus, only a "single" system can provide a strategic change in response to antagonistic threats and war, in which the resources required are prepared at local, regional, and national levels (Rietjens, 2006; Alexander, 2002). As developed countries are limited in adapting to rapid global changes, the idea of a single system becomes even more relevant. Possible cross-scale interactions can lead to rapidly escalating impacts on infrastructure while being very difficult for both management and current technologies to detect and address (Boin & McConnell, 2007; Cornwall, 2005, Peters et al., 2004); this leads to Proposition 2.

*P.2. A single integrated system in which emergency preparedness and civil defense are involved in responding to all types of hazards is essential for strategic responsiveness to changing demands.*

Responsiveness highly impacts emergency preparedness, in which the literature defines the safety and security components as a national system used to achieve management goals in uncertain times and war. Such a strategy can also strengthen an overall planning approach (Gray, 2010). There is a strong indication that linking the supply chain from the global to the regional and local levels is challenging, especially where there is a lack of coordination among actors and countries (Larson, 2012). Thus, harmonizing the emergency supply chain is not easy (Axelsson & Easton, 1992). Strategic management influences actors and, in the context of a general direction, the actors offer their resources (employees, managers, supplies, finance, and technology) in a competitive environment to support strong and robust coordination (Larson, 2012; Altay et al., 2009; Altay, 2006). The challenges of coordinating civil and military actors and resources can be substantial; however, they are necessary for responsiveness (Kaneberg, 2017; Alexander, 2002; Salamon & Sokolowski, 2001). This leads to Proposition 3.

*P.3. Harmonized coordination among actors in supply chain networks depends on successfully integrating their resources into the planning by creating a strategic level of SCM during stable and turbulent times development to adapt to a general context.*

## **Conclusion and future research**

The purpose of this study was to explore the impact of network responsiveness on supply chains and the management of safety and security through developed countries' emergency preparedness systems. We found that a responsive strategy for dealing with all types of threats must include all the relevant actors and share the necessary and most correct information.

*The first research question* addressed the system's challenges. We identified several challenges from the literature and discussed them in line with the even greater number of challenges found in the Swedish case study. The challenges mainly pertain to the complexity of policy, the lack of participation, and the difficulty in adequately disseminating information in the system. These issues are closely related to the existence of two parallel systems, where overlaps and a lack of clarity create further difficulties. The study contributes through data from several experienced personnel in responsible organizations, offering unique access to their experiences and opinions.

*The second research question*, regarding how the supply chain network can be developed to address the challenges, must be further explored. We formulated three propositions that represent three possible paths for improvement, knowing that any change to

network management is highly complex. We suggest that the strategic or system level is the most promising for addressing the weaknesses of the system.

The *implications in practice* are that emergency preparedness managers should link preparedness to an all-hazards planning approach. Great potential exists for improving managers' ability to switch focus towards integrated supply chain while considering how critical infrastructures interact. There is a tendency at the political level to focus mainly on recent experiences in planning, as in the Hurricane Katrina disaster (Parker et al., 2009). Implications for responsible organizations are that they must seek ways to effectively involve all civil society actors to deal with these risks. Managers' capability, in turn, has implications for the broader system because planning processes and a wide range of essential elements are required for the system to be responsive and provide efficient safety and security.

The *implications for governments* concern their ability to provide safety and security when moving between levels, for instance, from the responsiveness of local networks at the country level to involving parties from multiple countries. While countries integrate with others in strategic networks, this perspective is often missed at the response level, as the system is often operating under stressed circumstances. Policy implications concern the all-hazards approach that should be adopted more widely to enable countries to work together and align their supply chain network responsiveness. In terms of theory, we show the possibility of using supply chain networks to analyze their responsiveness, opening a new avenue for research. This can perhaps be integrated with the extant theory on swift trust and latent and active structures (Tatham & Kovács, 2010).

Future research is needed to investigate the planning, efficiency, and network responsiveness of preparedness further. This study provides an understanding of the network challenges in safety and security, which may contribute to developing a broader supply chain network to increase the responsiveness of actors in the system. Further research is required on the systems of other developed countries to complete these views. One avenue of research is to apply the propositions presented here in confirmatory studies using different data types (quantitative and spatial data). A second avenue is to conduct a more explicit network study that reveals the dynamics and interactions between different network levels.

## Acknowledgments

The authors wish to thank the Jönköping University for its support in the production of this article and the exceptional, knowledgeable, and experienced people involved in supply chain management and logistics. Our sincerest gratitude to all the experts that contributed their specific knowledge through interviews, seminars, and workshops and provided useful secondary documentation and those involved in the aspects of emergency

management, civil society, military, and humanitarian research on which this research study builds.

## Disclaimer

The authors do not declare any conflict of interest concerning this article. This study has been achieved by Elvira Kaneberg, Leif-Magnus Jensen, and Susanne Hertz from the Jönköping University, in Sweden.

## Funding

The authors do not declare any source of funding for this article.

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