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Mission impossible: operations management in complex, extreme, and hostile environments

Dube, Noni

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Mission Impossible: Operations Management in Complex, Extreme, and Hostile Environments

Nonhlanhla Dube

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The distinct black and white stripes of the zebra (*Dube*) make it one of the easiest creatures to spot in the wild. Yet, in a dazzle they create a camouflage that makes it difficult for predators to target and hunt down a single *Dube*. This sums up the existence of international humanitarian organisations. Each must sufficiently stand out to attract funding and other field advantages but must also blend in with the rest to succeed in the impossible mission of delivering assistance in knotty contexts.

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university of
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Mission Impossible: Operations Management in Complex, Extreme, and Hostile Environments

PhD thesis

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on the authority of the
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and in accordance with
the decision by the College of Deans.

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Thursday 31 March 2022 at 14.30 hours

by

Nonhlanhla Dube

born on 29 October 1983
in Bulawayo, Zimbabwe

Supervisors

Prof. J.T. van der Vaart
Prof. R.H. Teunter

Assessment Committee

Prof. D.P. van Donk
Prof. M. Besiou
Prof. G. Kovács

Kumama lobaba. I am, because you were.

SUMMARY

The environments in which international humanitarian organisations (IHOs) operate are not just complex, they are knotty. There are multiple features of the humanitarian context that create insurmountable obstacles for IHOs as they try to deliver life-saving assistance to populations in distress. For instance, extremely disruptive events caused by natural and manmade disasters happen in this context. Moreover, IHOs often face hostility as conflicts have become more dangerous and widespread. The realisation that the humanitarian context has such unique features led to a dedicated research stream for humanitarian operations in Operations Management (OM) in the mid-2000s. Interestingly, crises in other contexts have been observed to share similar features. Consequently, researchers increasingly argue that much can also be learned about conducting operations under impossible conditions from this context. Most recently, researchers have highlighted some lessons to be learned from the humanitarian sector about dealing the ongoing COVID-19 pandemic, an unprecedented crisis of our time. Nevertheless, these features and their implications for operations management (OM) remain ill-understood. This PhD thesis attempts to address this shortcoming. Using the humanitarian context as a research setting, I set out to learn about operations management (OM) challenges and strategies for crisis management in general and humanitarian relief in particular.

The thesis explores the implications of some of the defining features of the humanitarian context that render it knotty (complexity, extremity, and hostility) for key OM functions. Three prominent, yet under-researched, phenomena are used as the basis for unravelling those implications, i.e., complex emergencies, overlapping disasters (i.e., concurrent crises) and armed conflicts.

Complexity

In the first study (Chapter 2), the phenomenon of interest is complex emergencies which are defined by the World Health Organisation as situations in which there is a “breakdown of state structures, the disputed legitimacy of host authorities, the abuse

of human rights and possibly armed conflict”. Complex emergencies constitute the majority of humanitarian crises world-wide, are increasingly the backdrop against which major natural disasters occur, and tend to be protracted crises. The politically charged nature of complex emergencies implies that host governments tend to behave in ways that induce complexity in humanitarian operations.

The first study sought to understand how and why host governments behave towards IHOs and the subsequent impact on humanitarian logistics. Three factors are found to influence host government behaviour, namely (i) the levels of tensions between their strategic interests and those of IHOs, (ii) their general level of dependency on IHO services and (iii) their regulatory and enforcement capabilities. The sources of tension between host government-IHO interests range from political reasons that, for example, lead to restricted IHO access to areas controlled by non-state armed groups to genuine reforms like improving quality control which lead to stringent requirements for internationally sourced relief items. The level of dependency of the host government on IHOs is related to whether specific IHO services are needed to further the host government’s interests. Based on these three factors, four host government stances are identified: non-restrictive, opportunistic, selectively accommodating and uncompromising. Non-restrictive and opportunistic host governments tend to have low regulatory and enforcement capabilities which renders any existing tensions latent. In contrast, selectively accommodating and uncompromising governments have high levels of both (tension and capabilities).

The identified host government stances impact decisions in logistics including pursuing efficiency, investing in longer-term planning, and developing contingency strategies for dealing with uncertainty. For non-restrictive host governments, practitioners can focus on best practices as decisions and outcomes will be hardly influenced by the host government. Carefully selecting distribution channels, modes and frequency of transport and minimising buffer stocks are some possible considerations. However, with opportunistic host governments, it is important to consider host government actions that cause uncertainty and, thus, affect timeliness. Just-in-time approaches are unlikely to work and it is advisable to create buffers in anticipation of government-induced disruptions. Another consideration could be forming IHO alliances to improve accessibility of supplies, e.g., by sharing in-country supplies when some IHOs’ goods are held up at customs. In countries with a selectively

accommodating host government, it is advisable for practitioners to largely base decisions on the options that are available to them (e.g., accept long lead times and plan accordingly) and reserve negotiations for matters of paramount importance (e.g., seeking exceptions to quantity restrictions to cope with demand uncertainty). Over-engaging with host governments could compromise IHOs' ability to influence any host government decisions. With uncompromising host governments, negotiations with authorities often fail. However, some level of certainty can be achieved if practitioners prioritise understanding the regulations and being compliant. This implies the need for advance planning on inventory management and transport. Where host governments restrict IHO access to certain areas, establishing close partnerships with local organisations and building their capacity to respond can be an appropriate strategy.

Extremity

The second study (Chapter 3) focuses on overlapping disasters, i.e., concurrent crises, whereby sudden onset disasters or unexpected changes occur during ongoing humanitarian operations. Natural disasters have the most severe impact in regions affected by complex emergencies. Therefore, overlapping disasters are a common occurrence in humanitarian operations. Multiplicity and interactivity of factors also lead to overlaps in the crises that IHOs must respond to. This occurrence of “disasters within disasters” constitutes an extreme situation for IHOs. In addition to working under already very challenging conditions, extreme situations often lead to demand surges coupled with limited supply and transport options.

The second study used multiple methods to explore supply network resilience to extreme situations and learn more broadly about resilience. The (i) extent to which sudden onset disasters of unprecedented scale, duration, and scope impact supply chain performance and (ii) how IHOs deal with the major threats they pose to the continuity of supply for ongoing operations are of interest. The research is set in 2010, one of the worst years for the humanitarian sector in terms of sudden onset disasters. Four major adverse events impacting ongoing operations were selected. These are, in order of occurrence, the Haiti earthquake (Ha-E), Chad cholera outbreak (Cha-C), Pakistan Floods (Pak-F) and Haiti cholera outbreak (Ha-C). Unlike Cha-C, Ha-C was completely unforeseen as it was introduced in the country when contaminated tents from another humanitarian mission were brought in for the earthquake response.

To address (i), I conducted an econometric study of the impact of major sudden onset disasters on ongoing humanitarian operations at the node level, i.e., at the place of occurrence, and network level, i.e., the rest of the network's end-customers in different countries of operation. Results show interesting and sometimes contradictory effects between the node and network levels during the response to each of the events. Performance specifically: worsened at the node level (Haiti) but improved at the network level for Ha-E; improved on both node (Chad) and network levels for Cha-C; improved at the node level (Pakistan) but worsened at the network level for Pak-F; and worsened at both the node (Haiti) and network levels for Ha-C. A qualitative follow-up study shows that these differences can be explained by factors that facilitate or inhibit supply network members' ability to address changes in the operational environment. These changes can be supply, demand, and/ or process related. Furthermore, supply network members develop mechanisms for specifying roles in the preparedness phase (i.e., role definition, role clarity, role assignment, and role floating) and the response phases (i.e., role enactment, role (re-)assignment, and role exploration). If the supply network endures extremity for an extended period, this can cause inevitable disruptive impact across the network. The ability of supply network members to sufficiently respond is diminished and/ or they are not willing to expend more (long-term) resources toward a temporary crisis.

The appropriate combination of member roles that minimise negative performance impact depend on the foreseeability of sudden onset events, the events' overall impact (scale and scope of arising needs) and the duration of this impact. Environmental facilitators and inhibitors also play a role, for example, whether the government of an affected country declares a state of emergency and the availability of alternative transport routes. When facing familiar situations (such as Cha-C), to the fullest extent possible, role clarity and role assignment in the preparedness phase and role enactment in the response phase enhance supply network resilience. For unfamiliar situations (such as Ha-C), however, floating certain roles in the preparedness phase while being flexible to (re-)assign and explore those or other emerging roles in the response phase enhances supply network resilience.

Hostility

The third study (Chapter 4) diagnoses the state of the humanitarian ambition to alleviate suffering wherever it may exist in armed conflicts. The onset of the Arab

Spring-fuelled conflicts and the general decline in host government control in countries going through political crises have worsened security-related challenges for IHOs. There has been a sharp increase in targeted aid worker attacks – a reflection of increasing hostility towards humanitarian actors – and how they navigate this reality to deliver humanitarian assistance in armed conflicts is not well understood from an OM perspective.

The third study also uses multiple methods to better understand conflict environment characteristics that impact operations and how IHOs seek to achieve the best possible operational outcomes in response. The study combines the Humanitarian Action (HA) and OM perspectives to establish how the *modus operandi*, i.e., typical ways of working of an IHO, translates to operations strategy considerations and the implications for realised outcomes. Four major IHOs with different mandates and funding structures are selected to explore these linkages.

To characterise conflicts, I applied quantitative content methodology to analyse the annual reports of the four IHOs over a 6-year period. This resulted in a typology of conflict environments which is based on two dimensions: their reach in terms of the actors drawn into the conflict (local versus global, typically governments or armed groups) and the dominant issues driving the conflicts (goods versus creed, e.g., material resources and ideological differences, respectively). Both dimensions are seen as a continuum, rather than strictly categorical, and yield four primary conflict environments: goods-dominated, local (Go-L); creed-dominated, local (C-L); goods-dominated, global (Go-Gl); and creed-dominated, global (C-Gl). A qualitative study was then conducted to investigate the implications of conducting humanitarian operations in each of these four environments. Results show that, depending on their identity and mandate, IHOs try to influence the environment through reforming (e.g., improving general respect for humanitarian actors to reduce targeted attacks), revamping (e.g., increasing the effectiveness of the policing function to combat crime), and/ or reacting (e.g., initiating a response like publicly speaking out against the actions of a particular government or armed group to quickly improve operating conditions) to it. Successful efforts to influence the environment lead to spillovers that benefit the actors in the same environment and, hence, the overall sector. IHOs also try to adapt elements of their *modi operandi* to different sourcing strategies across conflict environments. Depending on their ability to access beneficiaries, they may

insource, outsource, and/ or use peripheral facilitation whereby they support other actors with access but do not (seek to) control their decisions and actions. Each decision carries inherent trade-offs between relevant performance objectives which are found to be cost, quality, speed, continuity, and coverage. When insourcing, IHOs must also decide on the appropriate security strategies.

Because of differing trade-offs for each sourcing (and security) strategy across conflict environments, the appropriate sourcing strategy ultimately depends on what an IHO deems most important and how loosely it interprets its fundamental values (e.g., the no weapons policy) and/ or is willing to compromise on them. Generally, in locally-oriented conflicts, insourcing (coupled with acceptance and protection security strategies) leads to the best quality and speed outcomes while outsourcing leads to better continuity and coverage. In Go-GI conflicts, similar results are achieved for both sourcing strategies. The difference compared to locally-oriented conflicts is that insourcing IHOs must employ more security strategies (i.e., acceptance, protection, deterrence, and remote management) to improve outcomes. In C-GI conflicts, good quality outcomes can be achieved through insourcing and employing the same four security strategies as in Go-GI conflicts. However, better quality outcomes can sometimes be achieved through outsourcing, which also offers better continuity and coverage. When either option is not viable, peripheral facilitation becomes the best approach but accountability, a major concern in HA, likely diminishes. Costs vary considerably among IHOs depending on how much they invest in security when insourcing and monitoring when outsourcing.

Concluding remarks

This thesis captures the important features of the humanitarian context that have major implications for OM and should, therefore, be considered more future research. Although this empirical work pre-dates the COVID-19 pandemic, it crucially reveals that challenges, approaches, and behaviour that were deemed new when the pandemic struck have always existed. Indeed, the chaos, mayhem, and even damaging stakeholder actions that have been witnessed during the pandemic underlie some of the operations management accomplishments of the humanitarian sector. Thus, this thesis offers a glimpse of how much can be learned from a sector that exists because of, not in spite of, complexities, extremities, and hostilities in its operational environment.

For IHO practitioners, I caution that when interpreting the results of this thesis, they should be aware that differences in mandates or missions, funding structures, and interpretation of the humanitarian principles could lead to different priorities and outcomes. Host government regulations across all studied phenomena, for example, may be applied on a case-by-case basis and are strongly influenced by these IHO characteristics. In extreme situations, the balance between the preparedness and response phases also varies from one IHO to the other. While the identified mechanisms with respect to supply network member roles apply in all situations, the extent to which specific IHO supply chains prioritise each phase will carry different implications for how quickly they must activate or deactivate different mechanisms to ensure supply continuity in overlapping disaster situations. I also argue that because of the goods-intense nature of OM-related aspects in humanitarian relief, insights from this research promise to shed light on broader challenges in HA. Logistics restrictions tend to be correlated with other issues like IHO registration, visa procedures, access and so on. Thus, understanding why and how the movement of supplies is impacted makes it possible to more concretely evaluate factors that would otherwise be difficult to discern. Admittedly, this would have its limits as, for example, the movement of people and of goods, as demonstrated in studies 1 and 3, involve different dynamics and risks.

Regarding crisis management more generally, a common concern for all sectors at this juncture is that crises that introduce knottiness to their operational environments are, unfortunately, only going to worsen. There is a need to constantly contemplate what the future could bring, predict the implications and, where possible, develop remedies, before reality catches up. But, as this dissertation shows, it is not all doom and gloom. Much can be achieved even under impossible conditions.

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CHAPTER 1

Introduction

Operations Management (OM) is everywhere (Slack et al., 2010) but the OM research field is yet to firmly establish its position as essential for knowledge advancement in knotty contexts. A case in point is the humanitarian context where the operational environment is more than just complex, it is further characterised by extremity and hostility (Banomyong et al., 2019; Besiou and van Wassenhove, 2020; Carroll and Neu, 2009; Dijkzeul and Sandvik, 2019; Kovács and Falagara Sigala, 2021; Larson, 2021; Tomasini and van Wassenhove, 2009). Humanitarian organisations face surging demand amid worsening operational challenges and declining donor support (Besiou and van Wassenhove, 2020; Petrudi et al., 2020). Increasing conflicts and climate change have fuelled crises that have pushed “unprecedented numbers of people into humanitarian need” (Robinson, 2020, p. 19). Combined, these issues have rendered delivery of humanitarian assistance to the most vulnerable people nearly impossible. Despite the explosive growth in humanitarian operations research since its inception, fifteen years on, the OM community is yet to fully grasp the implications of operating in such environments (Altay et al., 2021; Kovács et al., 2019; Majewsky et al., 2010). For instance, what are the implications of an inherently complex operational environment for OM? What happens when the already prohibitive conditions of complex environments suddenly worsen and thrust humanitarian actors into the most extreme circumstances? What about when hostility becomes the norm rather than the exception?

A better understanding of contextual features that induce knottiness can lead to valuable lessons for improving outcomes in the humanitarian and other sectors. The defining features of the humanitarian context are also dominant in military, government, and business contexts in times of crisis (Carroll and Neu, 2009; Kovács and Falagara Sigala, 2021; Pettit and Beresford, 2005). As knottiness becomes more widespread, impacting operations everywhere, exploring its implications for OM in depth is important now, more than ever. It has been argued, for example, that there

is an abundance of lessons to be learned from the humanitarian sector in the global response to the COVID-19 pandemic (Dube, 2020; Kovács and Falagara Sigala, 2021).

This PhD dissertation is an exploration of some of the most challenging issues in humanitarian operations. The overarching goals are (i) to learn about crisis situations that are characterised by complexity, extremity, and hostility (ii) in order to unravel their implications for providing life-saving supplies and (iii) how they can be mitigated. Until recently, such situations were perceived to be unique to the humanitarian domain but (will) increasingly permeate other contexts. High-impact disruptions, for instance, generally originate from the same sources that define or underlie humanitarian crises, such as natural disasters, terrorist attacks, pandemics, conflicts, financial and political crises (Kleindorfer and Saad, 2005; Kohrt et al., 2019; Kovács and Falagara Sigala, 2021). Therefore, there is great potential to ascertain the operational approaches that could lead to better alleviation of suffering for populations in distress and, simultaneously, to learn from the humanitarian sector about how all other sectors can cope with high-impact catastrophic events (e.g., Altay et al., 2021; Day et al., 2012; Kovács and Falagara Sigala, 2021; Scholten et al., 2015). Still, for this learning to occur, there are several hurdles to be overcome in the extant humanitarian operations literature. This further implies the need to learn from other disciplines that address knottiness more intently in order to “push the boundaries” of the field and enhance the relevance of OM in more sectors (Altay et al., 2021).

When I started my PhD journey, I had the fortune of conversing with a thought leader in humanitarian operations management. He confirmed what I had read and heard about international humanitarian organisation (IHO) practitioners: they were not keen on granting researchers access and spending, in his words, “precious time” working with them. He stated that he did not need another model to tell him the most efficient route from a point of safety where his organisation kept inventory to a dangerous place where he needed to deliver the supplies to desperate, and often trapped, aid recipients. He argued that he could generate a good-enough solution on his own but needed help with understanding and dealing with contextual issues that made the most efficient routes unviable and often deadly. His conclusion that humanitarian operations researchers are more likely to pursue modelling or simulation work has been echoed by researchers (e.g., Altay and Green, 2006; Altay et al., 2021; Banomyong et al., 2019). While quantitative methods have improved in rigor

and have improved decision-making in the field (Kovács et al., 2019), qualitative approaches remain underutilised despite their importance for enhancing our understanding of the challenges faced in humanitarian operations, how do deal with them, or even the limits of current practices (Kovacs and Spens, 2007; Kovacs et al., 2019; Larson, 2021; Natarajarathinam et al., 2009; Vega, 2018). This conversation set the course of my PhD journey. I knew I had to venture into the depths of the humanitarian context to get a better grasp of the implications of knottiness for OM.

1.1 Operations Management Research for Knotty Contexts

Mainstream versus Humanitarian Operations Research

There is little knowledge to be gleaned on knotty contexts in the mainstream OM research. Focus has predominantly been on stable commercial operational environments where predictability is comparatively higher (Kovács and Falagara Sigala, 2021). Researchers have prioritised topics on efficiency like cost minimisation, e.g., through approaches like just-in-time (Simchi-Levi and Simchi-Levi, 2020). Such considerations, while important for the humanitarian sector, are insufficient for addressing the volatile, complex, destructive, and even frustrating issues that practitioners face (Besiou and van Wassenhove, 2020; Petrudi et al., 2020; Robinson, 2020).

Some OM research breaks from stable environments and focuses on emerging economies, especially China, India, and Brazil. However, the topic of sustainability tends to dominate this part of the literature (e.g., An et al., 2015; Avittathur and Jayaram, 2016; Handfield et al., 2020; Monzer et al., 2017; Sodhi and Tang, 2015). Papers that explicitly address factors that complicate operations in unstable contexts are rare (e.g., Nollet et al., 1994). The vibrant supply chain resilience stream seeks to address some complicating factors (e.g., Ali et al., 2017; Han et al., 2020) but the concept of resilience itself remains elusive in OM (Hohenstein et al., 2015; Wieland, 2021; Wieland and Wallenburg 2013). More worryingly, we understand even less about threats that can push systems beyond their limits, e.g., events of unprecedented and long-lasting impact and concurrent crises (Craighead et al., 2020; Kohrt et al., 2019; Kovács and Falagara Sigala, 2021; van Hoek, 2021).

The humanitarian operations research stream endeavours to tackle knottiness and is, therefore, a good starting point for improving our understanding of knotty contexts.

This research stream was inspired by magnificent failures in responding to catastrophic natural disasters in 2004-5 (e.g., the Asian tsunami and earthquake as well as hurricane Katrina in the United States) which piqued researchers' interest because of their atypical contextual dynamics (e.g., Majewski et al., 2010; Van Wassenhove, 2006). One of the primary goals of this research stream was to assist the humanitarian sector to adopt good practices for improving effectiveness and efficiency (Beamon and Kotleba, 2006; Thomas and Kopczak, 2005). However, it became apparent that the OM principles that lead to success in mainstream settings are mostly rendered inapplicable by the unpredictable nature and context of humanitarian operations (Altay et al., 2021; Carroll and Neu, 2009). For example, whereas commercial organisations are functionally efficient with well-integrated financial and material/ service flows, IHOs operate as dual systems that are not-for-profit and depend on funding from emotive donors (Carroll and Neu, 2009; van Wassenhove, 2006). There are, therefore, complications in the relationships between humanitarian operations and human interactions as well as the funding of operations (Carroll and Neu, 2009). It is also difficult to evaluate commitment of different stakeholders and ensure liquidity because IHOs also have ambiguous objectives while donor behaviour is unpredictable (Tomasini and Van Wassenhove, 2009). All these issues are worsened by instability (e.g., due to being highly politicised and insecurity), unpredictability of demand and events, resource scarcity, and poor infrastructure in most humanitarian settings (Carroll and Neu, 2009; Kovacs and Spens, 2007; Majewsky et al., 2010; Tomasini and Van Wassenhove, 2009; van Wassenhove, 2006). Meanwhile, demand has increased exponentially and will continue on this upward trend in the foreseeable future (Kovács and Falagara Sigala, 2021). Although mainstream practices cannot be directly applied, there clearly remains an urgent need to improve the efficiency and effectiveness of humanitarian operations.

Key Shortcomings in Humanitarian Operations Research

In addition to the limited understanding of the implications of operating in the humanitarian context, the proven ability of IHOs to be adaptable and responsive to rapid changes under already challenging conditions is not well-understood (Kovacs and Fagala Sigala, 2021; L'Hermitte et al., 2016; Oloruntoba and Kovacs, 2015). Therefore, to leverage insights about crisis situations from humanitarian operations,

there are four major shortcomings to be addressed in the extant humanitarian operations literature.

Firstly, key issues that complicate operations, like politics and insecurity, remain underexplored (Altay et al., 2021; Altay and Green, 2006; Banomyong et al., 2019; Kovacs and Spens, 2007; Larson, 2021; Tomasini and Van Wassenhove, 2009). Research interest is greater for, and re-ignited by, natural disasters (Altay et al., 2021; Banomyong et al., 2019; Holguín Veras et al., 2012) which account for roughly 3% of humanitarian relief efforts (Van Wassenhove, 2006). The majority of humanitarian needs are caused by complex emergencies (Altay et al., 2021; Larson, 2020), which are defined by the World Health Organisation as situations in which there is a “breakdown of state structures, the disputed legitimacy of host authorities, the abuse of human rights and possibly armed conflict”. There also remains a disproportionate amount of work on preparedness for short-term relief operations (Altay and Green, 2006; Kovacs and Spens 2007). But, the majority of operations are long term or continuous (Banomyong et al., 2019). Thus, there is a need to first understand the inherent complexity that underlies humanitarian operations. Research that focuses on complex emergencies is essential for developing this understanding. It also naturally resolves the lack of focus on crises that account for the majority of humanitarian relief efforts and the overemphasis on preparedness for short-term relief operations in current literature.

Secondly, there has been limited research attention for extreme situations that exacerbate the complexity of conducting humanitarian operations. Specifically, overlapping disaster situations impact resource allocation decisions and overall planning (Rotkemper et al. 2011). For example, despite their comparatively low prevalence, the number of natural disasters has increased drastically since the sixties with no signs of relenting (Larson, 2021). Natural disasters and epidemics also occur against a backdrop of complex emergencies (Spiegel et al., 2007). As these phenomena are now global, the presence of such extremity in contexts that mainstream OM research has focused on is imminent (Kovacs and Falagara Sigala, 2021). While there is an abundance of research on natural disasters, conducting it independently of the broader humanitarian context implies that the impact of sudden-onset disasters on long-term operations – for better or worse – is ill-understood. Given the disproportionate amount of media attention and funding poured into such disasters,

it is crucial to establish the implications of this approach for long-term needs. In other fields, the importance of understanding such concurrent disasters has been emphasised (e.g., Culver et al., 2017; Spiegel et al., 2007). Interestingly, it has also been noted that the operational perspective is lacking in such extreme situations (Perone and Beran, 2017). The formation of temporary supply chains for responding to natural disasters versus the long-term response to protracted crises in the humanitarian sector, therefore, presents a natural opportunity to explore the extreme effects of concurrent crises in OM (Kovacs and Fagala Sigala, 2021). Focusing on such extreme situations would also advance knowledge on how the humanitarian sector achieves responsiveness and adaptability.

Thirdly, research on insecurity remains limited despite being a dominant concern in humanitarian operations due to increasing hostility towards IHOs in conflict environments (c.f., Jola-Sanchez et al., 2016; Larson, 2021; Mackay et al., 2019). Between the post-Cold war period and the 1990s, IHOs could operate relatively freely and encountered few security limitations – even in the most insecure places (Alexander and Parker, 2021). However, after the 9-11 attacks, conflicts drawing in diverse global actors emerged (e.g., the Global War on Terrorism and the Arab Spring). Now, increased brutal attacks on civilians, including aid workers, are a defining feature of conflict environments (e.g., Collinson and Elhawary, 2012; Donini and Maxwell, 2013; Egeland et al., 2011; Schneiker, 2013). The casualties from armed conflicts and the humanitarian needs they cause have been increasing, peaking in 2020 (Laron, 2021). The reversal of this trend remains elusive. Thus, establishing how IHOs can cope in hostile environments is of paramount importance.

Finally, the three preceding shortcomings are worsened by methodological hurdles which have stalled the development of intimate knowledge about the humanitarian context. Notably, as humanitarian operations research matures, researchers have lamented the general lack of rigorous methods to deepen understanding (e.g., Kovacs et al., 2019; Vega, 2018). Admittedly, there are practical hinderances to achieving this. The primary reasons are that IHOs are reluctant to share sensitive data and it is difficult to enter conflict areas (which are already dangerous for aid workers) (Kovacs et al., 2019; Oloruntoba and Banomyong, 2018). Less used empirical methods like case studies stand to address these issues (Kovacs et al., 2019) while enabling rigor in the assessment of real-world phenomena (Banomyong et al., 2019; Kovacs and Spens,

2007; Kovacs et al., 2019; Larson, 2021; McCutcheon and Meredith, 1993; Vega, 2018). Furthermore, despite the multifaceted nature of the challenges and stakeholders in the sector, there has also been limited interdisciplinary and mixed methods research on humanitarian operations (Altay et al., 2021). Such approaches are important for improving rigor and relevance thereby facilitating evidence-based decision-making in humanitarian operations (Altay et al., 2021; Kovacs et al., 2019; Kunz et al., 2017).

1.2 Research Aim and Approach

This dissertation aims to improve our understanding of the dominant and enduring aspects of humanitarian operations in order to generate insights that can lead to improved operational efficiency and effectiveness in this high-stakes environment. The primary goal is to learn about the implications of the defining characteristics of the humanitarian context, i.e., complexity, extremity, and hostility, for key OM functions (logistics, supply chain management, and strategy) more generally. Accordingly, this dissertation is case-based, incorporating multiple data sources and adopting multiple methods to address the aforementioned shortcomings in humanitarian operations research.

1.3 Research Chapters

There are three empirical chapters focusing on each of contextual characteristics: complexity, extremity, and hostility. Most humanitarian settings exhibit at least two of these characteristics, for example, targeted aid worker attacks reflect hostility towards IHOs and extremity as they are “disasters within disasters” (Larson, 2021). However, each chapter focuses on one characteristic for depth and palpability. For the same reason, I focus on one OM function per chapter.

All chapters are the result of independent work I undertook. Because of the uniqueness and novelty of each study, I worked under the guidance of researchers specialised in some aspects of the topics tackled. I have generated the research ideas, collected data (primary and secondary) and analysed it, developed all drafts and led their revision in response to reviewer comments where submissions have been made. For the analysis, some of the researchers I worked with have checked consistency and blind-coded data to ensure validity and reliability. Table 1 summarises the key details of each chapter. I briefly introduce each chapter next.

Table 1: Key details of each empirical paper

	Paper 1	Paper 2	Paper 3
Humanitarian Setting	Complex Emergencies (including armed conflicts and political crises)	Overlapping disasters (ongoing long-term operations, e.g., political crises, affected by sudden onset disasters)	Armed Conflict Settings (conflicts exhibiting different characteristics and implications for operations)
Main theme	Complexity	Extremity	Hostility
OM Focus	Logistics	Supply Chain Management	Operations Strategy
Main theory/ Concept	Institutional Theory	Complex Adaptive Systems	Modus operandi in the Humanitarian Action Field; sourcing strategy
Methods	<ul style="list-style-type: none"> Case study based Primarily qualitative content analysis and some quantitative analysis 	<ul style="list-style-type: none"> Case study based Mixed: econometric and qualitative content analyses 	<ul style="list-style-type: none"> Case study based Mixed: qualitative and quantitative content analyses
Data Sources	<ul style="list-style-type: none"> Primary interview and transactional data Secondary contextual data 	<ul style="list-style-type: none"> Primary interview and transactional data Secondary contextual data 	<ul style="list-style-type: none"> Primary interview data with practitioners and subject-matter experts. Secondary contextual, annual reporting, and security incidents data

Logistics and the Impact of Host Governments

The first empirical paper (Chapter 2) focuses on the logistics function and explores the impact host governments, as political actors, have on humanitarian logistics in complex emergencies. Although “government” is the most mentioned word in humanitarian logistics research (Kunz and Reiner, 2012), research exploring how and why they impact logistics remains scant. To ensure thorough treatment of the political element, the political science literature is incorporated.

Humanitarian logistics must ensure the efficient and effective flow and storage of goods or materials used to alleviate the suffering of disaster victims (Thomas and Kopczak, 2005). It has received the most research attention in OM (Kovacs and Spens, 2007; Thomas and Kopczak, 2005). Research, however, has yet to catch up to the peculiarities of the humanitarian context that affect logistics (Altay et al., 2021; Besiou and van Wassenhove, 2020). In the meantime, the number of people cut off from aid increases annually and has already doubled since 2016 (Willitts-King and Spencer, 2021). This research focuses on the implications for humanitarian logistics of the

under-explored, yet prominent, disaster type (complex emergencies) and critical actor (host governments). Host governments are charged with the responsibility to allow free passage of humanitarian supplies to affected civilians without exception (Haider, 2013). Even though they can support IHO efforts and are rarely the perpetrator in violent attacks, host governments can pose equally distressing challenges in humanitarian logistics (Dube and Broekhuis, 2018; Khan et al., 2019; Kunz and Reiner, 2012; Schiffing et al., 2020; Tomasini and Van Wassenhove, 2009).

Host governments and IHOs inherently have conflicting strategic interests (i.e., tensions between interests) but also high interdependency (Thornton and Ocasio, 2008). In complex emergencies, stakes are heightened for host governments because both tensions and dependencies can soar. How governments balance these tensions against any existing interdependencies can have major logistical implications for IHOs. How this manifests in host government actions and the subsequent implications for logistics are of interest.

The main contributions of the first empirical paper are the development of a typology of host government stances in international relief operations and the generation of novel explanations for host government actions in relation to humanitarian logistics. “Closeness to reality” is achieved and important insights into the humanitarian context are derived by employing institutional theory (Kauppi, 2013; Kovacs and Spens, 2011). Consequently, this research also has major relevance for practitioners in this “high stakes” environment (Balcik et al., 2010).

Supply Chain Resilience in Overlapping Disaster Situations

The second empirical paper (Chapter 3) focuses on the supply chain management function and explores supply network resilience to extreme situations. The chapter simultaneously responds to the calls to seek to learn more broadly about resilience from the humanitarian setting (e.g., Scholten et al., 2014; Day, 2014) and to consider the nature and context of occurrence of extreme events in resilience research (Borgatti and Li, 2009; Day, 2014; Kim et al., 2011; Tukamuhabwa et al., 2015). To capture adaptability and the mechanisms that lead to overcoming disruptions, the chapter draws on complex adaptive systems theory which perceives of supply network entities as intelligent actors with agency to adapt to environmental changes to secure survival (Choi et al., 2001; Nair and Reed-Tsochas, 2019).

Extreme situations are rare. But, because of their unprecedented scale, duration, and scope, they pose a major threat to the continuity of supply and livelihoods (Craighead et al., 2020; van Hoek, 2021). Although resilience research has been steadily growing (Ali et al., 2017; Hohenstein et al., 2015; Wieland, 2021), the most extreme scenarios remain under-studied in supply chain management (Craighead et al., 2020). This chapter focuses on overlapping disaster situations to learn about coping with extremity. In those situations, stakes are even higher for IHOs. They must ensure that they meet new demand arising from natural disasters while fulfilling existing obligations (often from protracted crises) under very difficult conditions. The problem of the general lack of research on extreme situations is compounded by the elusive nature of resilience in OM and the limited consideration of the environment. The second empirical paper, therefore, makes an earnest attempt to tackle these issues simultaneously in order to get a better grasp on supply chain resilience.

The second empirical paper makes three major contributions. The study contributes to theory by revealing how disruptions caused by extreme situations are qualitatively different from typical disruptive situations (Bamberger and Pratt, 2010; Craighead et al., 2020). Furthermore, by using an objective measure of disruptive impact, namely delivery performance, overcomes the existing hurdle of reliance on self-reported subjective and/ or qualitative performance measures (Hohenstein et al., 2015; Melnyk et al., 2014; Tukamuhabwa et al., 2015). This enables us to reliably establish the disruptive impact of an event – or, surprisingly, lack thereof – at both the network level and at the place of event occurrence (node level). The cause for the effects can be explained by the joint effect of network member interactions in the context of the event's occurrence, i.e., contextual embeddedness (Tukamuhabwa et al., 2017). Finally, it generates insights into the less understood adaptive behaviour at the level of the supply network (Nair and Reed-Tsochas, 2019) by zooming in on how network members interact during preparation for, and in response to, extreme events.

Operations Strategy for Hostile Environments

The third empirical paper (Chapter 4) focuses on the strategic function of OM and explores operations strategy for hostile environments. The chapter diagnoses the state of the humanitarian ambition to alleviate suffering wherever it may exist (Calhoun, 2008). The aim is to use OM concepts and techniques that are better-positioned to

objectively assess the strengths and limits of international humanitarian assistance in conflict environments.

In HA, there is an ongoing vivid debate about what it takes to achieve operational success in conflict environments (e.g., Adami, 2021; Collinson and Elhawary, 2012; Egeland et al., 2011; Roepstorff, 2020; Schneiker, 2013). The debate has largely focused on IHO *modi operandi*, i.e., typical ways working, which are informed by IHO identities and values (Adami, 2021; Collinson and Elhawary, 2012; Barnett and Snyder, 2008; Barnett and Weiss, 2008). The identity-centric roots of the *modus operandi* align with the OM notion that organisational identity informs operations strategy (OS) (e.g., Slack and Lewis, 2008). This research, thus, superimposes the *modi operandi* of IHOs on the OM perspective to explore the problem primarily in the OM domain.

Building on the assumptions of the trade-offs model (Boyer and Lewis, 2002; Sarmiento et al., 2018; Skinner, 1996; Sum et al., 2004), the research incorporates the environmental factors which are recognised as crucial in HA but under-explored in OM (e.g., Liu et al., 2018). This enables meaningful contribution to the long-standing debate in HA about IHO practices in conflict settings (e.g., Donini and Maxwell, 2013; Fast et al., 2013; Hilhorst et al., 2016; Taithe, 2014) and leads to insights into HA-specific issues in hostile environments. The interdisciplinary approach adopted in this research also exposes the limitations of best practices thinking in hostile environments. Some capabilities cannot be replicated across conflict environments and the effectiveness of different strategies depend on the situation. In exchange, it uncovers how varied organisational strategies, both formal and implicit (Tunälv, 1992), can enhance overall outcomes in hostile environments.

CHAPTER 2

Host Government Impact on the Logistics Performance of International Humanitarian Organisations

Abstract

Host governments severely impact international relief operations. An openness to assistance can lead to the timely delivery of aid whereas a reluctance to receive assistance can have devastating consequences. With lives at stake and no time to lose in humanitarian crises, understanding the host government's impact on the logistics performance of international humanitarian organisations (IHOs) is crucial. In this paper, we present an in-depth multiple- case study that explores this aspect. Results show that host government actions are explained by their dependency on IHOs and the levels of tensions between their interests (i.e., conflicting strategic goals). In addition, a host government's regulatory and enforcement capabilities are important for ensuring that they can safeguard their interests. We derive four stances that host governments can adopt in regulating logistics-related activities: non-restrictive, opportunistic, selectively accommodating and uncompromising. Each of these has different implications for the logistics performance of IHOs.

Key words: Humanitarian logistics; host governments; delivery performance; complex emergencies

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2.1 Introduction

Host governments are political actors with a major impact on the inventory management and transport activities of international humanitarian organisations (IHOs) (Kovacs and Spens, 2008; Long and Wood, 1995; Tomasini and Van Wassenhove, 2008; Menkhaus, 2010). In fact, “government” is by far the most frequently mentioned topic in humanitarian logistics research (Kunz and Reiner, 2012). While some host governments facilitate good performance by declaring a state of emergency and relaxing regulations, others impose barriers that impede performance (Long and Wood, 1995; McLachlin et al., 2009; Menkhaus, 2010; Pettit and Beresford, 2005; Toole and Waldman, 1997). Understanding why host governments display such heterogeneity in dealing with IHOs is crucial for enhancing delivery performance in humanitarian operations.

This research seeks to understand the impact of host governments on humanitarian logistics in complex emergencies. The World Health Organisation (WHO) defines a complex emergency as a “situation with complex social, political and economic origins which involves the breakdown of state structures, the disputed legitimacy of host authorities, the abuse of human rights and possibly armed conflict, that creates humanitarian needs”. Complex emergencies constitute the majority of disasters worldwide and are increasingly the backdrop against which major natural disasters occur. They are characterised by large-scale multi-faceted humanitarian needs that are worsened by major security issues, population displacement and the hindering of humanitarian assistance by political or military actors.

We posit that host government actions are best explained by the strategic-level dynamics of their interactions with IHOs. Host governments and IHOs are governed by divergent institutional logics (Alford and Friedland, 1985). They inherently have conflicting strategic interests (i.e., tensions between interests) but, nevertheless, high interdependency (Thornton and Ocasio, 2008). Since tensions between interests and dependency are not mutually exclusive, this raises the question as to how the two interact and impact on the delivery performance of IHOs in day-to-day (operational level) and medium term (tactical level) planning and activities.

An in-depth multiple-case study approach is used to identify the core drivers and effects of host government actions on delivery performance, to establish patterns of

linkages between them and to develop explanations for those linkages (Voss et al., 2002). The research logic is theory building, and we employ institutional theory to develop an initial understanding of the phenomenon. This approach of incorporating foundational theories in this type of research is highly recommended (e.g., Colquitt and Zapata-Phelan, 2007).

The main contributions of this research are that we develop a typology of host government stances in international relief operations and offer novel explanations for actions taken by host governments in relation to humanitarian logistics. We achieve “closeness to reality” and generate important insights into the humanitarian context by employing institutional theory (Kauppi, 2013; Kovacs and Spens, 2011). Consequently, this research also has major practical relevance for managers operating in this “high stakes” environment (Balcik et al., 2010).

2.2 Research Background

Logistics Decisions and Delivery Performance

Delivery performance in terms of lead-time and timeliness is a major priority in logistics, and it is strongly influenced by the quality of managerial decisions (Brown and Vastag, 1993; Gunasekaran et al., 2001; Vachon and Klassen, 2002). At the tactical and operational level, decisions regarding transport (including mode, the movement of aid workers, routing and scheduling) and inventory management (including sourcing) are important (Gunasekaran et al., 2001). Good delivery performance is especially crucial in a humanitarian setting given the high stakes associated with meeting beneficiary needs (Balcik et al., 2010).

The role and Impact of Host Governments in Humanitarian Logistics

Host governments and international actors have obligations in major humanitarian crises that are outlined in various legal frameworks (for an overview, see Haider, 2013). In a crisis, host governments are obligated to adequately protect and provide for the affected populations within their borders. If they do not fulfil this obligation, they should allow international actors to intervene. Host governments then become responsible for coordinating and facilitating the operations of international actors by implementing the relevant (inter)national regulations. International actors are obligated to be impartial and provide assistance solely for humanitarian purposes. A myriad of international actors become involved in major crises, often including non-

governmental and private organisations, United Nations agencies, donors, militaries and the International Committee of the Red Cross (Balcik et al., 2010). The focus of this study is limited to IHOs that offer direct material assistance to affected populations. Other important actors, such as the military and donors, fall outside the scope of this research.

Complex emergencies occur in fragile states where governments are usually weak and incapable of providing an appropriate response, or are autocratic and unwilling to fulfil their obligations (Albala-Betrand, 2000). Put simply, state fragility relates to a host government's incapacity or unwillingness to provide public goods (Ziaja, 2012). Although fragility does not absolve host governments of their obligations, there are provisions within legal frameworks for shifting responsibility from host governments to more capable and/or neutral international actors. Therefore, IHOs can play a pivotal role in complex emergencies, especially in areas of international armed conflict. Various legal frameworks apply in complex emergencies depending on the scale of the conflict. When there is no armed conflict, the international disaster response laws, rules and principles apply (as they do in natural disasters). Human rights law and international humanitarian law apply in civil armed conflicts and international armed conflicts respectively. Two issues addressed within these frameworks that directly affect humanitarian logistics are the sovereign consideration of declaring a state of emergency and the obligation to allow free passage of supplies for humanitarian assistance.

The declaration of a state of emergency is a necessary condition for immediate IHO involvement in non-armed and civil armed conflicts. When declared, IHOs can provide material assistance with limited bureaucracy. If a state of emergency is not declared, IHOs are essentially not welcome but can still intervene under non-emergency regulations. A consequence of this is that they likely face logistical challenges such as lengthy and complicated customs procedures for internationally sourced goods (Long and Wood, 1995; Pedraza-Martinez and Van Wassenhove, 2013; Van Wassenhove, 2006). The diversion of relief supplies by host governments or by other parties to the conflict can also be a problem (Menkhaus, 2010; Toole and Waldman, 1997). In international armed conflicts, there is no legal provision for government derogation based on sovereignty considerations. Consequently, the declaration of a state of

emergency is not necessary for immediate IHO involvement. Security constraints then become the primary limiting factor.

The obligation to allow free passage of IHO supplies to affected areas varies under each of the legal frameworks. In unarmed conflicts, it is the host government's sovereign right to forbid passage- regardless of the humanitarian situation, and IHOs need to find ways to persuade the host government to grant it. In civil armed conflicts, human rights law obligates host governments to allow free passage of supplies on the basis of the right of civilians trapped in war zones to have access to life-sustaining supplies. In international armed conflicts, host governments are automatically obliged to allow free passage of supplies because there is no provision for derogation. However, the legal framework provisions related to armed conflict do not prevent host governments from imposing procedures that can slow response efforts. For example, they can hamper relief efforts by making it difficult to obtain travel permits to affected areas (Kovacs and Spens, 2009; Pettit and Beresford, 2005).

Despite the provisions made in the legal frameworks, several practical limitations are still faced in humanitarian logistics. First, as the International Disaster Database (EM-DAT) shows, the declaration of a state of emergency or a call for international assistance is rare. To date, the database captures only 14 complex emergencies since 1932 and just two since 2010 (Yemen and Central African Republic, both in 2012). Second, the anarchic nature of conflict and/or the weakening of structures leave little room for the rule of law in weak states while in autocratic states, host governments can inhibit IHO activity in ways that cannot be easily proven to violate the law. For instance, autocratic governments may impose blockades on materials for humanitarian assistance citing lack of IHO impartiality. This was the case in 2009 when the government of Sudan stopped relief activities by abruptly expelling 13 IHOs.

Drivers of Host Government Impact on Decisions and Performance

In humanitarian logistics research, it is argued that IHOs intervene because the host government lacks capacity to respond to a disaster yet political interests are identified as primary drivers of host government actions (Balcik et al., 2010; Kunz and Reiner, 2012; Pettit and Beresford, 2005; Tomasini and Van Wassenhove, 2009). These views are in line with the some of the underlying reasons for the provisions made in the humanitarian assistance legal frameworks. However, the evidence is mostly anecdotal

and there is no clear understanding of the nuances that lead to heterogeneity in host government behaviour.

The preceding review contains elements that are encompassed in two core branches of institutional theory: the three pillars of institutions and institutional logics. The choice of this theory, and of elements related to our inquiry, was determined in an iterative process as described in Section 3. Governments have a regulatory role and, when applicable, sovereign power to apply their jurisdiction in extraordinary situations. These (regulatory role and sovereign power) are embedded in the three pillars of institutions as proposed by Scott (2001): regulative, normative, and cultural-cognitive. The regulative pillar relates to how governments enact their regulatory role to control behaviour of those subordinate to their authority; the normative aspect concerns the moral base for assessing the legitimacy of rules; and the cultural-cognitive aspect relates to legitimacy that stems from a shared understanding of the situation. This branch of institutional theory assumes there are widely accepted values that inform the behaviour of the various actors (Greenwood et al., 2008).

In reality, governments purposefully act to balance their inherent dependency on not-for-profit organisations against the tensions between their interests (Mcloughlin, 2011; Najam, 2000; Young, 2000). For instance, IHOs conducting cross-border relief operations interfere with host government interests as borders are a highly sensitive issue in international relations (Bratton, 1989; Najam, 2000). Such tensions between interests have caused host governments to close or stall IHO programmes regardless of their dependency status in certain instances (Albala-Bertrand 2000; Bratton, 1989). Although this tension does not significantly affect the application of the regulatory function of host governments, it does mean that the other two pillars are less useful when it comes to understanding the strategic aspect of host government actions that go beyond widely accepted values.

As such, the normative and cultural-cognitive aspects are inappropriate for explaining behaviour in complex emergencies. For the normative aspect to function, the government has to demonstrate commitment to doing what they are supposed to do in the right way (Stinchcombe, 1997). In complex emergencies, this is rarely the norm. Further, the belief that government regulations are often intended to hinder relief efforts has led to the rise of IHOs that sometimes undermine state sovereignty in their

efforts to reach affected populations (Natsios, 1995). Regarding the cultural-cognitive aspect, a shared understanding of the situation between host governments and IHOs rarely exists; suspicion and mistrust prevail (Kunz and Reiner, 2012). The institutional logics branch of institutional theory was adopted because of its relevance in addressing purposeful action by host governments and for accommodating the divergent views of actors. Here the dependency-interests paradigm and the host governments' endeavours to respond to it are also recognised (Alford and Friedland, 1985; Thornton and Ocasio, 2008).

Despite the richness of institutional theory and the multiple perspectives taken to understand government relations with not-for-profit institutions, research has so far paid little empirical attention to government – IHO relations (McCloughlin, 2011; Moran, 2006; Najam, 2000) and their implications for humanitarian logistics. In response, we address this gap using empirically grounded research. Furthermore, since the theory adopted in this research was identified through iterative data analysis, no a priori hypotheses have been made. Figure 1 shows the framework that guides the research with an emphasis on the theory and the constructs that were eventually adopted.

2.3 Methodology

Research Setting and Design

The research design is a multiple-case study as this is the most appropriate approach for answering how and in what circumstances questions (Voss et al., 2002; Yin, 1994); here, the impact of host governments on delivery performance in humanitarian logistics is of interest. Furthermore, since international relief in complex emergencies constitutes a highly complex setting, an emphasis on the real-world context is crucial (Eisenhardt, 1989a; Eisenhardt and Graebner, 2007).

The research entails an embedded design with two levels of analysis. First, we focus on the operational and tactical level, where host government actions affecting logistics decisions and subsequent delivery performance are analysed. Second, we work back to the strategic level to draw inferences about the drivers of host government actions that impact humanitarian logistics at the operational and tactical level. This two-level analysis enables the generation of reliable and rich models (Eisenhardt, 1989b) of the underlying causes of observed patterns at the operational and tactical level by taking

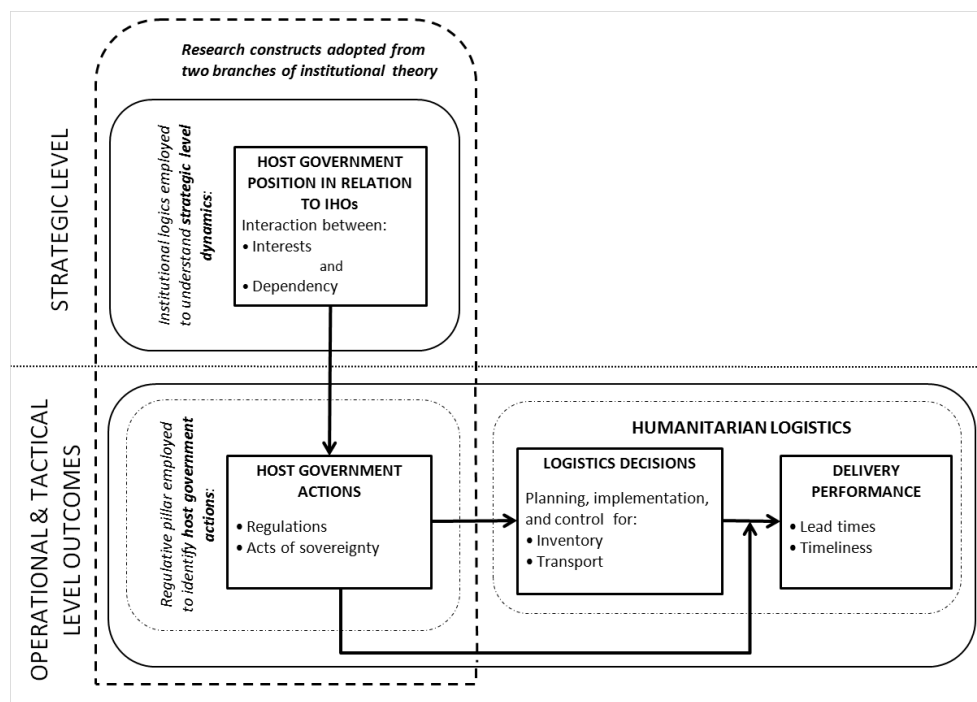


Figure 1: Research framework

the strategic level into account. The research process was iterative with four rounds of analysis (Figure 2).

Case Selection

The unit of analysis is a country in an ongoing complex emergency situation. Six cases were selected (Table 1), thereby fitting the recommended range of 4 to 10 cases for theory building research (Eisenhardt, 1989a). To control for multiple external factors and closely link delivery performance to host government actions, the cases were selected from a single focal IHO that has an established presence in complex emergencies.

The IHO is a leading medical organisation that spends about three-quarters of its operational budget in countries affected by complex emergencies. It has Dunantist roots (i.e., it is rule-averse and strives for independence from host government influence in its operations) (Stoddard et al., 2009). As such, it could invoke behaviour that might otherwise be latent in host governments (Baruah, 2007; Najam, 2000) and

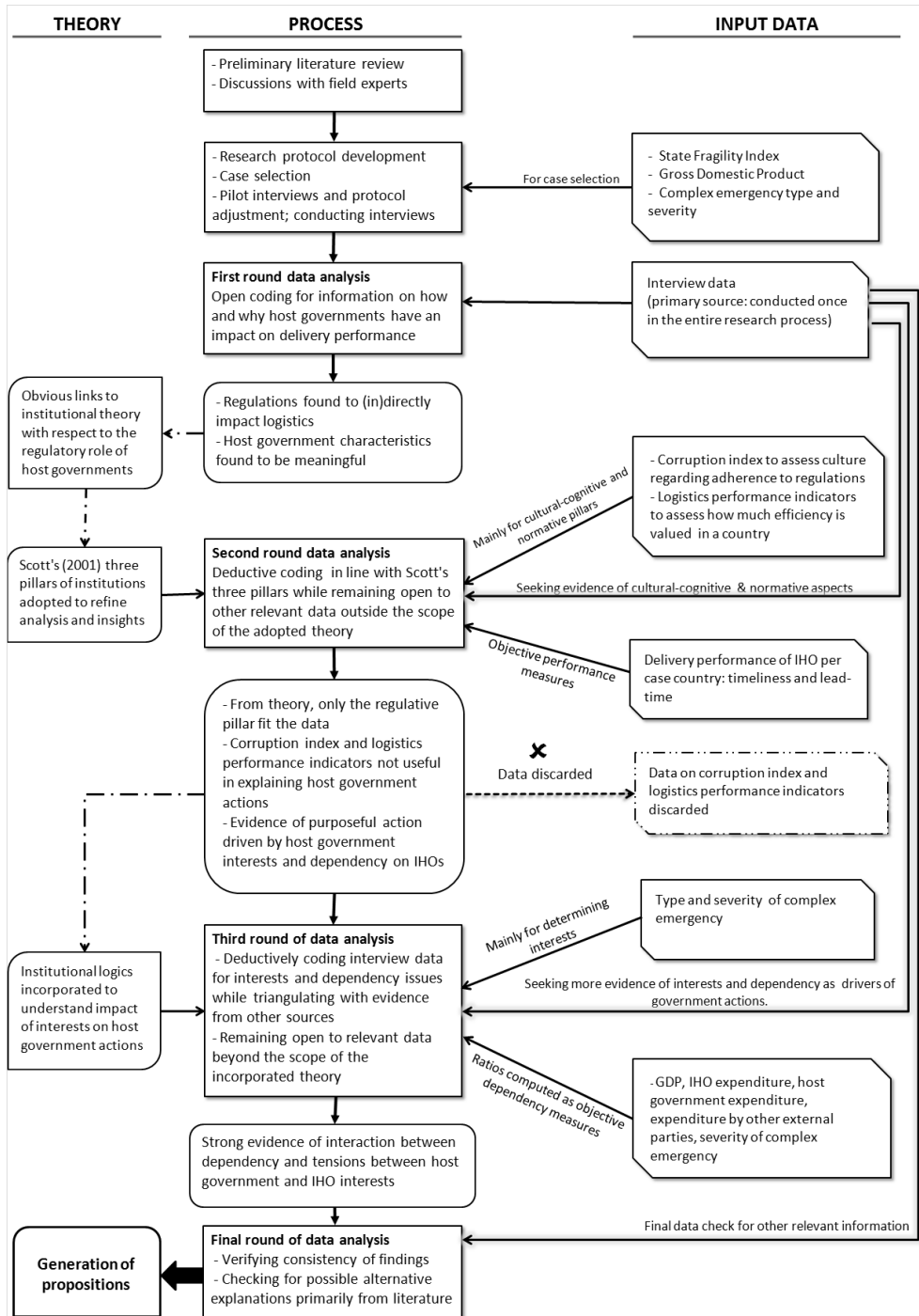


Figure 2: Research process

Table 1: List of selected cases

Case (Country)	MAIN CASE SELECTION CRITERIA		COMPLEX EMERGENCY	
	Gross Domestic Product (GDP) ¹	State fragility ²	Nature / type	Level of severity ³
U	Low	Extreme	Long-term civil war with widespread armed conflict within the country.	Medium # Dis: 2 - 5 million #NFA: > 5 million
V	Low	Extreme	Post-war country with recent official end to war but full stability yet to be achieved.	Low # Dis: 2 - 5 million #NFA: 2 - 5 million
W	High	Extreme	Long-term civil war with pockets of armed conflict within the country.	Medium # Dis: < 0.5 million #NFA: 2 - 5 million
X	High	Extreme	Post-insurgency: conflict officially ended but remains in those areas where rebel groups are still fighting for independence from the country. Complete stability yet to be achieved in the post-insurgency region.	Low # Dis: 1 - 2 million #NFA: >> 5 million
Y	Low	High	Political and economic crisis characterised by political instability and high levels of inflation but no armed conflict.	Low # Dis: << 0.5 million #NFA: 2 - 5 million
Z	High	High	Insurgency: conflict with violence that is confined to areas where certain groups are rebelling against the government and/ or fighting for independence from the country.	High # Dis: 1 - 2 million #NFA: >> 5 million

1. High/Low GDP countries defined as countries that are in the top/bottom 90 worldwide in terms of GDP.

2. Based on the State Fragility Index (SFI): Extreme = SFI between 20 and 25; High = SFI between 16 and 19.

3. High/Medium/Low based on ConflictMap measure related to number of displaced people and level of violence, and on the general status of the country at the time of data collection.

Dis is the approximate number of internally displaced people plus nationals assuming refugee status in other countries.

#NFA is the number of people needing food assistance due to experiencing severe food shortages.

therefore constitutes an extreme example in the complex emergency response landscape from which much can be learned (Bamberger and Pratt, 2010).

We selected cases from countries in which the IHO had a presence of at least ten years in order to achieve a good understanding of the context. The identities of the focal IHO and the cases are not revealed because of data sensitivity. Since we sought to make general statements about host government behaviour, it was important to select cases that were “polar types” (Eisenhardt and Graebner, 2007; Miles and Huberman, 1994). However, polarity could not be established upfront, so we conducted a two-phase selection procedure. First, cases were selected on the basis of the countries’ economic states and their fragility in order to ensure significant variation among them. The economic state of a host country was measured using Gross Domestic Product (GDP) estimates from the World Bank and Trading Economics (tradingeconomics.com). Although GDP is only a crude measure of a country’s economic situation, it provides a good indication of the resources at the disposal of a government. Considering GDP estimates made it easier to draw inferences about incapability or unwillingness of host governments to provide public goods. A distinction was made between low GDP

countries, which we defined as countries in the bottom 90 worldwide, and high GDP countries (the top 90).

The State Fragility Index (SFI) (Marshall and Cole, 2008) was used as a measure of state fragility. The SFI ranges between 0 (not fragile) and 25 (extremely fragile). Since complex emergencies occur in fragile states, only countries with SFIs ranging from 16 to 25 (highly fragile to extremely fragile) were considered (Marshall and Cole, 2011). We also checked for evidence of multicollinearity between the GDP value (which is used as a measure of economic effectiveness in the SFI score calculation) and the SFI score and found none (Pearson correlation value = .807, $p < .01$).

In the second phase, further variation among cases was ensured by selection on the basis of the type and severity of the complex emergency. The British Broadcasting Corporation (BBC) news country profiles (bbc.co.uk) and ConflictMap (conflictmap.org) were used as primary sources.

Data Collection

Interviews were the primary source of data. An interview protocol with semi-structured questions was developed and piloted (Voss et al., 2002) with three respondents in December 2012. It was then adjusted accordingly (Yin, 1994) before the second round of interviews in March 2013. All the interviews were conducted by the first author. Questions covered general aspects of the complex emergency and how the host government affected inventory management and transport-related decisions and outcomes (Appendix I).

Fifty interviews, between 6 and 11 per case, were conducted with highly knowledgeable and experienced respondents who (had) worked for the IHO (Appendix II). The second round of interviews was conducted during a gathering of the IHO's logistics personnel (both those working in the field and at headquarters). Respondents who had first-hand knowledge of more than one country were interviewed more than once, with each interview focused on a specific case to ensure separation of country-specific information. In total there were 22 respondents (R#1 to R#22) from various backgrounds and with 6 to 25 years (mean 13.1 years) of work experience. This mix of respondents had diverse perspectives which reduced the likelihood of "convergent retrospective sensemaking" and biased recollections of events (Eisenhardt and

Graebner, 2007). Time spent with a respondent ranged between 16 and 105 minutes (mean 47.4 minutes).

Data from seven other sources (Table 2) were used to complement and triangulate evidence from the interviews in order to ensure internal validity (Eisenhardt and Graebner, 2007; Voss et al., 2002). In addition to being used in the case selection, the nature of the complex emergency and GDP data were later incorporated in the analysis as they were useful for understanding the emergent constructs of dependency and tensions between host government and IHO interests.

Data Measures, Coding and Analysis

Quantitative Data

Quantitative measures for each case were derived from five data sources (Table 3). Since the dependency of an institution tends to be measured in financial terms (Young, 2000), we followed the traditional approach of measuring government dependency (Oliver, 1991) by comparing host government funds to funding provided by the focal IHO and other external sources. In particular, we considered expenditure on healthcare to capture dependency on the medical focal IHO and other external sources involved in, or funding healthcare. A limitation of this approach is that due to missing data in the WHO database, it is possible that the host government expenditure measure (Table 3) includes funding from external sources that is channelled through the host government.

Qualitative data

Interviews were transcribed and a qualitative content analysis conducted (Miles and Huberman, 1994; Schrier, 2014). We began by deductively coding for four types of information based on the theoretical framework (Figure 1). Inductive codes were developed for emerging themes that helped to refine insights into host government actions. The codes and sample quotes derived from the data are presented in Table 4. More extensive coding for host governments actions and evidence of tensions and dependency are presented in Appendices (III to V). The qualitative data were coded by the first author and, to ensure validity, the second author blind coded a sample of quotes using a coding scheme provided by the first author. The percent agreement level was 0.94, comfortably within the highly acceptable range (0.9 – 1.0) (Neuendorf, 2002). This simple measure was used as an alternative to traditional reliability

Table 2: Data sources and use

DATA SOURCES AND TYPES			USED TO ASSESS:				
DATA SOURCE		DATA TYPE	OPERATIONAL			STRATEGIC	
			Logistics decisions	Delivery performance	Host government actions w.r.t logistics	Host government dependency	Host government interests
IHO	Interviews	Interviews	✓	✓	✓	✓	✓
	International sourcing	International sourcing data		✓	✓		
	Archival	IHO financial expenditure per case country				✓	
Trading Economics, World Bank		Gross domestic product				✓	
ConflictMap, BBC News		Nature and history of complex emergency					✓
IHO interviews							
World Health Organisation*		Healthcare expenditure by host government and other external sources				✓	

✓ Data source used as a minor source of evidence or mainly for triangulation purposes
 ✓ Data source used a key source of evidence
 * Data for country Y not available

measures since these do not cater for a situation in which a concept is represented by multiple codes in qualitative content analysis (Scott et al., 2012). Further, the third author verified the coding and scoring undertaken by the first two authors.

Table 3: Definition, measurement and derivation of quantitative variables/measures

QUANTITATIVE VARIABLES/FACTORS - DEFINITION, MEASUREMENT AND DERIVATION	
VARIABLE	DEFINITION/ MEASURE
DELIVERY PERFORMANCE¹	
Lead time	Measured as the average time between order receipt by the focal IHO's sourcing department and the actual delivery of the ordered item to the requesting country.
Timeliness	Measured as the percentage of deliveries that arrive on or before the <i>requested</i> delivery date specified by the ordering country.
HOST GOVERNMENT DEPENDENCY²	
1. <i>Gross Domestic Product (GDP)</i> (as used in case selection)	
2. <i>Source expenditure as a percentage of total healthcare expenditure in a case country³</i>	
Host government expenditure as a percentage of total healthcare expenditure	Level of net host government's own contribution to expenditure on health expressed as a percentage of total expenditure on health in the host country (source: WHO).
Focal IHO expenditure as a percentage of total healthcare expenditure	Total focal IHO expenditure in a host country expressed as a percentage of total expenditure on health in that country. This includes the IHOs direct expenditure on health (e.g. medicines, medical personnel) and other activities (e.g. storage and transportation costs).
Expenditure by other external sources as a percentage of total healthcare expenditure	Other external resources for health in the host country expressed as a percentage of total expenditure on health. This indicator reflects the origin of the resources used to purchase health services. Some of these external sources will be channelled through the government's budget, some through insurance agencies and some through the private or NGO sectors (source: WHO).

1. Derived from focal IHO's international sourcing data from 1 Jan 2011 to 31 Dec 2012. Means, standard deviations and percentages derived at order line level.

2. Percentages derived from World Bank and Trade Economics data (for GDP) and from WHO data on health expenditure and total IHO expenditure data. For all measures, average values for the years 2010 - 2012 were used. The exception is country Y where no data are available for host government expenditure and expenditure by other external sources.

3. Total healthcare expenditure, in addition to host government expenditure, focal IHO expenditure and expenditure by other external sources as defined above includes voluntary health insurance payments, government social security schemes and other schemes for compulsory health insurance, and direct payments by households. These three additional indicators were also taken from WHO data.

Table 4: Examples of a priori and emergent codes and representative quotes

A PRIORI, REFINED AND EMERGENT CODES PLUS EXAMPLE REPRESENTATIVE QUOTES	
A priori / emergent second-order codes and categories	First-order concepts (representative quotes)
Strategic level dynamics	
(Level of) Tension in interests‡ Low/ latent* (Logical extension) High	"They don't obstruct, or they don't obstruct yet. The need for NGOs is obvious, or they simply lack the capacity to obstruct NGOs." ** "[These people] are systematically oppressed (...). There is a lot of hostility from the other ethnic groups which clearly shows that the NGOs and the UN are the ones who have actually enabled this group to survive. If the NGOs would not be there, this group would not have survived, so then they say like they want all the NGOs to go (...)."
(Level of) Dependency‡ Low High	"[This IHO] is a drop in the ocean for authorities." "But the cooperation [in country V] is extraordinary. They (the host government) understand that they do need humanitarian organisations. And at the field level we are incredibly popular [as an IHO] (...)."
Regulation and enforcement capabilities*	
Low* High*	"They did not have human resources to impose regulations. So you could at the time do whatever you want according to your internal policies and procedures." "Not clear to us was that regulations had always been there but the authorities didn't have the means [to enact them] but, the regulatory authority now had means of supervising the implementation of these rules."
Operational level	
Host government actions	
Regulations	
Inventory management	"Country X in itself is not so complex for getting through customs. What has made it complex over the years is that the country has started implementing a quality scheme for pharmaceuticals and later expanded it to medical devices."
Transport	"[We have to apply for project visits] five weeks in advance (...). So if I mention I want to travel to [3 places] and they don't want me to go to one of those 3 places, they will reject that travel authorisation. They will not say you can't go to this one but you can go to those two. They will absolutely reject the whole thing. Then they will ask you to apply again (...)."
Acts of sovereignty	
Inventory management related	N/A
Transport related	"We are free to move in [country X] but tied to our own security route. But then, in the [insurgency] region, it was of course the only road which we were allowed to use (...). But then this is a highly militarised area with full blown insurgency so once again I would consider access control to be a military standard operation (...)."
Decisions and delivery	
Decisions	
Limited decision space - supplier selection	"[In order to bring a product into country X, it] must be registered, the manufacturer must be validated, the importer must have an agency agreement with the manufacturer, and it must be a licensed importer (...). [Local purchase] was a bit disappointing (...), they were not having their whole range of products all the time (...)."
Deflection of intended performance outcomes (Logical extension)	"Predictability, repeatability of these processes, is what allows you to prepare and to really make things happen one shipment after another. But if it always depends on who we speak to, and maybe whether we can convince them to allow us this time, then you are actually not getting anywhere. Then it's not predictable anymore."
Delivery performance	
Lead time	"The projects who want to intervene, who need to treat people, who have nurses and medical staff standing by, they are (...) waiting, waiting, waiting."
Timeliness	"(...) They could not manage to clear it on time. There were some difficulties with some papers."

‡ Codes initially emerged from the data and later refined through adoption of theory to further guide the analysis and enrich insights

* Emergent codes

** Some quotes represented multiple codes, this is one example. The same quote suggests high host government dependency and low regulatory and enforcement capabilities.

The coding and analysis of data were conducted in two stages. First, in order to determine host government impact on delivery performance at the operational and tactical level, interview data were coded and analysed for: (i) host government actions related to regulations and acts of sovereignty (i.e. policies, procedures, rules and laws) that impact upon delivery performance; and (ii) related logistics decisions and delivery performance for inventory management and transport (first-order analysis). Thereafter, we established links between (i) host government actions and (ii) logistics decisions and delivery performance through an iterative process (second-order analysis).

In the second stage, open coding was used to obtain an initial impression of the dynamics of host government – IHO interactions at the strategic level. This was then refined based on the identified relevant constructs of dependency and tension between interests (first-order analysis). In the second-order analysis, the focus was on how the interaction between dependency and interests influenced host government actions. Since other unforeseen relevant institutional aspects could not be ruled out, the coding was open to further refinement and extension of key factors. This led to two important additions. First, in triangulating the financial and interview data, it emerged that extensive external funding relative to host government expenditure dampened host government dependency, and so we refined host government dependency accordingly. Second, we found and incorporated that a host government is able to guard its interests when tensions arise if it has sufficient regulation and enforcement capabilities, an aspect recognised in institutional theory (Giddens, 1984; Scott, 2001).

Next, a within-case analysis was conducted in order to identify unique case patterns followed by a cross-case analysis to mitigate the risks of exaggerating meaning, improve groundedness and enhance the generalisability of the findings (Eisenhardt, 1989a; Miles and Huberman, 1994; Voss et al., 2002).

2.4 Results and Analysis

Table 5 shows the delivery performance results derived from the focal IHO's sourcing data. A negative timeliness value indicates that deliveries arrived before the requested delivery date while positive values reflect delays. Triangulation of the interview data with delivery performance results indicated that respondents had a realistic perception of the actual delivery performance.

Table 5: Delivery performance by case

Case	FOCAL IHO DELIVERY PERFORMANCE					
	Lead time		Timeliness ¹		(Corroborating) evidence from interview data	
	Mean	Std. Dev	Mean	% ≤ 0 ²	Representative quotes related to delivery performance	Unprompted cross-case comparisons
U Civil war, medium severity	98.6	37.2	-4.2	49.5%	"Clearance time at the ports of entry is highly unpredictable... We now have 2 new containers on the way [to country U] and I am just holding my breath..." (R#3)	
V Post war, low severity	77.1	31.0	-7.4	83.6%	"They did not have human resources to impose regulations. So you could at the time do whatever you want according to your internal policies and procedures." (R#10)	"Compared to my previous missions I should say country V is a paradise. I have never been in a country like that ..." (R#13)
W Civil war, medium severity	117.1	37.8	12.4	41.9%	"Getting an import permit takes 3 to 6 months... Once you get the permit it is valid for 3 months but you can extend it for 3 months 3 times." (R#5)	"... Countries like X, ..., Y, W nightmares to import goods, nightmares to bring people in..." (R#19)
X Post insurgency, low severity	108.7	65.9	35.4	31.7%	"The information to be found is not clear, it changes, it is not well maintained, it is not easily published, it is interpreted by different people in different ways and that makes it very unpredictable." (R#3)	Country X has the reputation that it is quite a complex environment to work in.... Even now there are more states like that ..., country Z." (R#4)
Y Political & economic crisis, low severity	112.6	48.1	12.0	58.6%	"You may have an incident where things have already been shipped but you get to the airport and then you're just told this drug cannot come into the country. So it's either it has to be shipped back or quarantined for testing... once they approve that it can come in, then it may be released maybe in about 3 months..." (R#22)	"Country Y was not comparable with country X, country Y was [easier]." (R#8)
Z Insurgency, high severity	164.2	60.8	27.9	42.1%	"We have got quite a lot of restrictions and sometimes you have no problems for 8 months and then the problem starts.... They have got their rules, they are changing them, and it has influenced our importation which for me now is the biggest problem." (R#15)	

1. Lead time and timeliness estimates derived from IHO international sourcing data

2. Mean and standard deviation (Std. Dev) measured in days

Within Case Analyses

Country U

At the operational level, Country U had an average lead-time of 98.6 days and a timeliness rate of 49.5%. The host government did not impose any extraordinary regulations or invoke sovereign considerations that would impact on logistics decisions. However, it emerged that delivery performance was heavily influenced by corrupt practices (R#6, R#16, R#17). Physical capacity and infrastructure constraints were also reported to play a significant role (R#3, R#6, R#19).

At the strategic level, the host government received substantial institutional funding from external sources who contributed 46.1% towards the country's healthcare budget (including 1.2% from the focal IHO). The host government's contribution was about 5.6% of the total budget. The remaining 48.3% was raised in-country through various means including private funds and insurance (Appendix IV).

It emerged from the interviews that the large number of external sources meant that the host government was less dependent on individual funding sources, i.e., the spread had a dampening effect on dependency. With multiple funding options, the host government had little incentive to facilitate a good delivery performance for individual IHOs. The level of tension between interests was generally perceived as low even though its existence was not ruled out. It could have been that the government's need to deal with multiple armed forces was a higher priority than its relationships with IHOs or, as some respondents put it, the host government "don't care" about the work of IHOs (R#3, R#6, R#16, R#17, R#19). The relatively low level of dependency coupled with a low tension between interests resulted in the host government being indifferent towards IHO activities. As a result, opportunism and the lack of timely action by government officials were key challenges.

"The government is very corrupt. People are only interested in money, and not what happens really on the ground. (...). I don't know how our relation really is but, as I see it, we are there to try to reach those most in need... There are very few people [within the government] who are really interested in the wellbeing of the population (...)." (R#6)

Country U's low dependency, despite its low GDP and extreme fragility, was surprising. Nevertheless, despite the virtual absence of restrictive regulations, the actions of host government officials still caused uncertainty that affected logistics decisions and outcomes.

Country V

In country V, the average lead-time was 77.1 days and the timeliness rate was 83.6%. The host government neither imposed exceptional regulations nor exercised its sovereign powers and, as such, did not affect the IHO's logistics decisions and delivery performance. Financial and interview data revealed that, at the strategic level, the host government was highly dependent on the focal IHO.

"They try to play a strong state, but they aren't [one] because they don't have infrastructure, and they know that without [the focal IHO] they can't do anything. We are not a drop in the ocean, we are a serious player." (R#15)

Although there was no evidence of tensions between interests, some respondents argued that it could be latent because of the host government's high dependency and

limited regulation and enforcement capabilities. The level of dependency was high with about 27.5% of the total healthcare budget coming from external institutional sources (including 4.3% from the focal IHO). The host government's own contribution was approximately 14.2% of the total budget and the remaining 58.3% was raised through various in-country sources. For a country with an extremely low GDP, these figures imply serious gaps in healthcare funding.

Given the high level of dependency coupled with very low or latent tensions between interests, the host government did not restrict the IHO's logistics activities. The focal IHO freely made decisions; leading to good delivery performance.

“Compared to my previous missions (...), country V is a paradise (...). I have never been in a country like that where almost all my requests for customs [clearance] are agreed. I have all my tax exemptions.” (R#13)

Country W

In country W, the average lead-time was 117 days and the timeliness rate was 42%. The host government imposed significant limitations on logistics. The IHO's decision space was limited in terms of annual order quantities, order cycle times and frequency of travel to affected areas. Approval times were long and unpredictable. The quantity restrictions appeared to be imposed as a way of reducing the scale of the focal IHO's operations. Transportation of supplies was not highly regulated but a request for travel by individuals to controlled areas had to be made five weeks in advance with no guarantee that the request would be granted.

At the strategic level, there was a low level of host government dependency. The host government was the largest institutional spender on healthcare, contributing about 10.9% of the total budget with 77.5% coming from in-country sources. The focal IHO contributed 3.5% towards the total budget whereas other external sources contributed an additional 8.1%. Tensions between interests were high, mainly because the focal IHO served a population group that the host government “systematically oppressed” (R#5). IHO presence was believed to be mostly due to the host government's lack of “political will” to serve the group.

“What we are trying to cover is not about lack of boxes of drugs (...). If there was a political will, we don't need to be there (...). It's a rich country; they have

enough resources, including the most important resources... capable, skilled manpower.” (R#5)

The low level of host government dependency coupled with the high tension between interests translated into an uncompromising stance in regulating humanitarian logistics. Regulations were imposed without explanation, and there was limited room for negotiation.

Country X

The average lead-time in country X was 109 days and the timeliness was 32%. The host government severely limited the decision space of the focal IHO. Key challenges were in terms of limited supplier selection options, stringent paperwork requirements and the requirement to supply drugs with a near-maximum shelf-life. Transport activities in insurgency areas were also controlled with respect to routing options. As part of the customs pre-clearance procedures, supplies to be brought into the country were supposed to be purchased before they could be approved. Sometimes, purchased products were rejected resulting in serious delays.

At the strategic level, the host government contributed 4.2% towards the host country’s total healthcare budget. About 47.2% came from external sources (including 0.5% from the focal IHO). The diverse sources of external funding had a dampening effect on host government dependency. The host government dictated the rules of engagement.

“Country X has the reputation that it’s quite a complex environment to work in, partially as a result of the government (...) being a strong, or ever stronger, state.” (R#4)

The tensions between interests were high. The major issues that emerged were the misalignment between quality schemes and the occasional control of access to insurgency areas. The low level of host government dependency coupled with high tension between interests translated into an uncompromising stance in regulating humanitarian logistics.

Country Y

Country Y had an average lead-time of 112 days and a timeliness rate of 59%. Two regulations limited the decision space of the focal IHO. First, internationally sourced

supplies had to be purchased before a customs pre-clearance request could be made. Second, there was a requirement to obtain local vendor approval for internationally sourced supplies. Although this contributed to long lead-times, the focal IHO still opted for international sourcing because of quality concerns.

“So, can you imagine? You are running a business in [this] country and I come to you, you have this stuff in your shop and I say, well actually it's nothing, quality-wise it's nothing. But please sign here a statement that says that you don't object that I go and get it somewhere else because the authorities need it, otherwise I cannot import.” (R#2)

At the strategic level, the interview, GDP, and BBC news data strongly suggested that country Y is highly dependent on external funding. Considerable tensions between interests were evident regarding medical treatment protocols and local purchasing. The high level of host government dependency coupled with these high tensions translated into a selectively facilitative stance in regulating humanitarian logistics. For instance, the host government was unwilling to compromise on medical protocols, but would allow international sourcing if the IHO obtained local vendor approval. It was initially surprising that the country was able to regulate logistics activities despite its major financial crisis. However, upon reflection, it emerged that the country had developed low cost monitoring and enforcement mechanisms through random checks of shipments, imposing high penalties for failure to follow the regulations and by requiring IHOs to seek approval from local vendors.

Country Z

In country Z, the average lead-time was 164 days and timeliness was 42%. Lead-times were severely impacted by stringent paperwork requirements for internationally sourced supplies and the banning of supplies from certain major manufacturers. Transport activities were heavily regulated in insurgency areas, limiting the focal IHO's routing options and transport frequency. The focal IHO sometimes had no physical access to certain areas for months on end. Occasionally, the host government exercised its sovereign powers and ordered the focal IHO to indefinitely cease activities.

At the strategic level, the host government had a low dependency on external sources of funding. Its expenditure on healthcare relative to the total budget was by far the

highest compared to other institutional sources at 25.8%. External sources contributed 5.7 % toward the budget (including 0.1% from the focal IHO). The remaining 68.5% came from in-country sources (Table 3). The tensions between interests were high, notably regarding operating in insurgency areas and sourcing from certain manufacturers. The host government's low dependency coupled with the high tension between interests resulted in an uncompromising stance in regulating humanitarian logistics.

"We are a small fish. We can't even change the regulations!" (R#12)

Cross-case Analysis

Table 6 summarises the main findings for each of the six cases. An initial cross-case comparison revealed that tensions between interests only affect humanitarian logistics if a host government has regulatory and enforcement capabilities to influence outcomes. However, in the two cases where the host governments did not have high capabilities (countries U and V), the respondents commented that it was difficult to conclusively attribute the relative absence of restrictions to low tensions. If regulatory and enforcement capabilities are low, the host government has no systematic way of monitoring and controlling IHO activity and any existing tensions may consequently become latent. Further, when tensions between interests are low, the host government's desire to strictly monitor and control IHO activity is likely to be low, even if it has good regulatory and enforcement capabilities. Thus, distinct from the high tension – high capabilities combination, the overall implications for the other three combinations (high/low, low/high and low/low tension/capabilities) are the same.

Based on the above reasoning, in Figure 3, we combine the tensions between interests dimension with the regulation and enforcement capabilities dimension, and juxtapose this new dimension against dependency. This leads to four broad categories of predominant stances that host governments can assume which we label as non-restrictive, opportunistic, selectively accommodating and uncompromising.

Table 6: Summary of findings

		SUMMARY OF FINDINGS						
		STRATEGIC LEVEL DYNAMICS		OPERATIONAL LEVEL IMPLICATIONS				
		Host government interests	Host government dependency**	Interaction: interests - dependency***	Host government actions	Humanitarian logistics		
		Capabilities*	Overall dependence on focal IHO	Host government stance	Regulations/ acts of sovereignty	Logistics decisions	IHO Delivery performance ranking	
		Level of enforcement capabilities to address tension?	Dependence dampened by multiplicity of external funding sources	Dominant stance towards IHO	Impacting performance	Limited decision space?****	(depending stability of outcomes) Lead time Timeliness	
Case	Evidence of tension?	Low Lack of financial and human resources	Low Dependency dampened by multiplicity of external funding sources	Indifferent Neither displays a strong disapproval of, nor delight in, IHO activity	None	No	Rank #2 Mean 98.6 days	Rank #3 On time 49.5% of the time
U	No/latent severity							
V	No/latent severity	Low Major lack of financial and human resources	High Host government desperately needs assistance	Non-restrictive Generally does not monitor/regulate IHO activity	None	No	Rank #1 Mean 77.1 days	Rank #1 On time 83.6% of the time
W	Yes Civil war, medium severity	High Due to financial and human resources availability; reducing scale of IHO operations	Low Host government is largest institutional spender on healthcare; high income status; funding gaps due to "lack of political will"	Uncompromising Generally imposes tough regulations with little or no room for compromise	Regulations Related to both inventory management and transport.	Yes Order quantities, order cycle time, travel frequency	Rank #5 Mean 117.1 days	Rank #5 On time 41.9% of the time
X	Yes Post insurgency, low severity	High Due to financial and human resources availability	Low High income status; abundance of funds from other external sources	Uncompromising Generally imposes tough regulations with little or no room for compromise	Regulations: Inventory management and transport	Yes: Supplier selection, order cycle time, purchase precedes import approval, routing	Rank #3 Mean 108.7 days	Rank #6 On time 31.7% of the time
Y	Yes Political & economic crisis, low severity	High Achieved by reducing monitoring costs and discouraging defiant behaviour	High Crippled by financial crisis; very little support from external funding sources	Selectively accommodating Accommodates focal IHO over certain issues but is uncompromising on policy related issues	Regulations: Inventory management	Yes: For internationally sourced supplies: purchase precedes import approval; at least 3 local vendors should approve of international sourcing decision	Rank #4 Mean 112.6 days	Rank #2 On time 58.6% of the time
Z	Yes Insurgency, high severity	High Financial and human resources available	Low By far the largest institutional contributor to healthcare compared to all other funding sources	Uncompromising Generally imposes tough regulations with little to no room for compromise	Regulations: Inventory management and transport Acts of sovereignty: Transport	Yes: Supplier selection, travel frequency, routing	Rank #6 Mean 164.2 days	Rank #4 On time 42.1% of the time

* Added as an extension to the original framework. The importance of a host government's regulation and enforcement capabilities to address tensions between interests emerged from the analysis.

** Refined to accommodate observed dampening effect of multiple funding sources. The initial assumption was that the more the funding a host country receives, the higher the host government dependency.

*** The observed result of the interaction of tension and dependency at the strategic level, a central line of inquiry in this research.

**** Relates to the finding that host governments frequently influence logistics decisions by limiting an IHO's options.

HOST GOVERNMENT STANCE TOWARDS HUMANITARIAN LOGISTICS AND ITS IMPLICATIONS	
TENSION BETWEEN INTERESTS & REGULATION AND ENFORCEMENT CAPABILITIES*	High
	Low
Low	High
DEPENDENCY	

<p>UNCOMPROMISING - most challenging</p> <ul style="list-style-type: none"> - In general, the host government highly limits IHO decision space through regulations and acts of sovereignty; little to no room for compromise. - Tight control on inventory management related aspects, notably imports. Although these tend to increase lead times, they generally have a high level of predictability. - Both regulations and sovereign considerations can limit routing and scheduling options and can lead to unpredictable outcomes regarding timing of movements (scheduling) in controlled areas. 	<p>SELECTIVELY ACCOMMODATING</p> <ul style="list-style-type: none"> - In general, the host government imposes some limitations on IHO decisions through regulations and acts of sovereignty; can be accommodating/facilitating of certain outcomes. - Moderate control on inventory management related aspects which tends to increase lead times. Overall lead-time is not always predictable. - When applied, control on transport affects scheduling decisions (largely due to regulations and much less frequently due to acts of sovereignty).
<p>OPPORTUNISTIC</p> <ul style="list-style-type: none"> - In general, the host government does not actively affect IHO decision space. However, delivery performance is occasionally negatively impacted by random acts attributable to opportunistic behaviour. - There are no regulations or acts of sovereignty that have a major impact on inventory management and transport decisions/outcomes. 	<p>NON-RESTRICTIVE - least challenging</p> <ul style="list-style-type: none"> - In general, the host government does not control or regulate the bulk of IHO activities. There is considerable room for compromise and the IHO has a large decision space and a wide span of control. - There are no regulations or acts of sovereignty that have a major impact on inventory management and transport decisions/outcomes.

* Low if regulation and enforcement capabilities are low **OR** if tension between interests is low
 High if both tensions between interests **AND** regulation and enforcement capabilities are high.

Figure 3: Host government responses to humanitarian logistics and performance implications

Non-restrictive host governments

A distinguishing feature of the one case in this category (country V) is the amount of freedom the focal IHO had in decision-making. All decisions crucial for delivery performance are at the IHO's discretion. Recognising that a host government's lack of restraint could be because it lacks the capabilities to control IHO activities (see Olson, 2006) or because it welcomes IHO involvement (see Bratton, 1989), our characterisation of the host government as non-restrictive includes both these scenarios. This finding leads to our first proposition:

Proposition 1: Non-restrictive host governments exert little influence on humanitarian logistics activities, thereby paving the way for good decisions and delivery performance.

Opportunistic host governments

Only Country U fell into this category. Although the country has some regulations, these have not negatively impacted delivery performance. The challenges the IHO faces are largely attributed to the government authorities' indifferent attitude. Their

actions can go either way, and this generates uncertainty. For instance, the lack of customs regulations can lead to fast clearance times, but the latter was sometimes hampered by officials seeking bribes or being absent from work. Nevertheless, as argued earlier, the host government would be severely constrained by its limited regulatory and enforcement capabilities even if it desired control to address tensions in interests. In either case, host governments, or at least their representatives, can resort to opportunistic behaviour by seizing opportunities to their own advantage. This causes uncertainty for IHOs.

Proposition 2: Opportunistic host governments take random actions that hamper decision-making and performance in humanitarian logistics.

Selectively accommodating host governments

Country Y stood out from the other low GDP cases because it had a clear desire and ability to control IHO logistical activities. It is “a very sophisticated bureaucracy” with many regulations in place (R#14). However, despite clear tensions between interests over several issues, the host government was relatively accommodating on logistical issues.

Proposition 3: Host governments that are selectively accommodating limit IHO logistics decision options to an extent, thereby partially affecting outcomes and delivery performance.

Uncompromising host governments

All the high GDP countries (W, X, and Z) fell into this category. There is some variation in the specific regulations imposed by each host government, but they share a generally uncompromising stance regarding regulations. Negotiations with authorities often fail. In these countries, longer processing times are experienced because of unusual requirements that are unique to the settings. However, the duration of these processes is largely predictable. Uncertainty mostly relates to the control of movement. Not knowing when a transport ban will be lifted or if one will be imposed creates challenges in making inventory management decisions about when to replenish and how much inventory to keep in areas where access is limited.

Proposition 4: Uncompromising host governments severely limit the logistics decision space of IHOs, and this has a major impact on delivery performance.

2.5 Discussion

Key Research Insights

The most significant insights from our research relate to the strategic level dynamics that inform host government actions. Tensions between host government and IHO interests create a desire for control in host governments. Host governments can then use regulations and acts of sovereignty and this affects delivery performance in humanitarian logistics. However, enforcement capabilities are essential for their successful enactment.

If a host government is not overly dependent on an IHO and there are strong tensions between their interests coupled with regulation/decreed enforcement capabilities, it adopts a generally uncompromising stance. If such tensions and enforcement capabilities exist but the host government is dependent on IHO involvement then it is likely to adopt a selectively accommodating stance. In this scenario, host governments are open to compromise on certain issues affecting delivery performance. Where there are low tensions between interests, or they remain latent due to limited regulatory and enforcement capabilities, host governments tend to be opportunistic if their dependency is low or adopt a non-restrictive stance if their dependency is high.

Two additional insights are worth discussing. First, the availability of financial resources is not a prerequisite for host government control. We found host governments that had developed subtle ways of regulating humanitarian logistics without using significant financial resources. For example, random checks and high penalties for non-compliance are common, relatively low-cost, tactics employed by institutions (Sutinen and Kuperan, 1999). Second, although political motives are widely cited as the reason for host governments imposing tight regulations (Balcik et al., 2010; Kunz and Reiner, 2012; Pettit and Beresford, 2005; Tomasini and Van Wassenhove, 2009), we found substantial evidence of genuine reform leading to tight regulations. For example, several respondents mentioned that host governments receiving in-kind assistance for healthcare increasingly impose stringent quality control measures in response to the massive influx of counterfeit medicines in developing countries (Fernandez et al., 2008). This perhaps partially explains why the bulk of regulatory challenges in inventory management relate to international sourcing.

Implications for Research and Practice

As reflected in the four stances towards IHO logistics activities derived in this paper, the actions by host governments in complex emergencies are more systematic and foreseeable than previously assumed. Our study shows that host governments have a negative impact on delivery performance through either limiting the decision space of IHOs or by deflecting expected outcomes once decisions have been made. The former has a largely deterministic character whereas the latter generates uncertainty. Understanding the distinction between the two modes of impact is important in developing appropriate response strategies.

We also contribute to the ongoing debate in the economic development and political science research fields about governmental strategic responses to activities by international humanitarian and other non-governmental organisations (Najam, 2000; Young, 2000). Our empirically grounded findings can add value to these fields where the research has been largely conceptual or anecdotal (McCloughlin, 2011). Furthermore, the way we have adopted institutional theory validates the pressing need to integrate different branches of the theory to enhance its explanatory power (Hall and Taylor, 1996) thereby boosting its ability to explain complex phenomena.

In terms of practice, although our findings for IHO logistics relate to complex emergency situations, they may also apply to other disaster settings since host government considerations about tension and dependency are ever present. Furthermore, they could apply in the broader relief context. If a host government is uncompromising on logistics, it will probably also be uncompromising when it comes to regulations and decrees concerning IHO registration, visa procedures, policies and so forth. Turning to humanitarian logistics, operational and tactical decisions should be tailored to the host government's stance. We now offer recommendations for each of the four stances.

When facing non-restrictive host governments, practitioners can focus on best practice as decisions and outcomes will not be influenced by the host government. Effectiveness and efficiency can be achieved by, for example, carefully selecting distribution channels, modes and frequency of transport, minimising buffer stocks, and adopting just-in-time delivery strategies. However, with opportunistic host governments, it is important to take account of practices that cause uncertainty and

thus affect timeliness. Just-in-time approaches are unlikely to work and it is advisable to create buffers in anticipation of random impacts. At the strategic level, a potential solution is to form alliances among international actors to reduce the impact of random encounters on delivery performance, e.g., by lending supplies to those whose goods are held up at customs.

In countries with a selectively accommodating host government, it is advisable to seek maximum gain by making the best possible decisions for those matters fully at the discretion of the IHO. Wherever possible, practitioners should base decisions on the options that are available to them in matters where the host government is uncompromising, and reserve negotiations for matters of paramount importance. With such governments, there is potential to influence certain host government choices at the strategic level because of the government's high dependency levels.

Most regulations imposed by uncompromising host governments result in longer lead-times but a reasonable level of certainty can be achieved if compliance is prioritised by practitioners. This implies the need for advance planning on both inventory management and transport. Investing resources in becoming aware of, and compliant with, host government regulations is worthwhile as this will reduce uncertainty. At the strategic level, developing ways to minimise the impact of actions that generate uncertainty is probably the best approach. For instance, if host governments restrict IHO access to certain areas, establishing close partnerships with local organisations and building their capacity to respond can be an appropriate strategy. However, care should be taken, especially in relation to preserving the humanitarian principles of impartiality, neutrality and independence.

We also caution that IHOs should be aware that the predominant stance of a host government depends on the general level of tensions between interests and its dependency on IHOs. However, different IHO mandates and resources could lead to different outcomes where regulations are applied on a case-by-case basis. For instance, an uncompromising host government may issue more travel permits to IHOs with whom the tensions are lower while applying the same customs regulations to all IHOs. Therefore, an IHO should understand how the host government perceives it specifically, and how it perceives IHOs in general, in order to improve the quality of its decisions.

2.6 Conclusions, Research Limitations and Future Research

By focusing on IHO-led relief operations in complex emergency settings, we have unravelled the underlying complexities that inform host government actions and their impact on humanitarian logistics. We derived four main host government stances from six cases, namely: non-restrictive, opportunistic, selectively accommodating and uncompromising (Figure 3) and developed four key propositions based on these stances that can be tested and verified in future research.

In developing the propositions, the underlying logic was that restrictive behaviour is most likely if tensions are high and a government has the necessary regulation and enforcement capabilities. This premise was corroborated by all our six cases although one should note that only two (countries U and V) had other than this high tension – high capabilities combination. Given that interviewees found it difficult to attribute the less restrictive behaviour in these two cases to either low tension and/or low capabilities we combined these variables. Since we combined these variables on the basis of two cases, this is a limitation of this research. It would be worthwhile to conduct further empirical research into the extent to which high capabilities are relevant when tension and dependency are low. Admittedly, such a combination will be rare in complex emergencies since it reflects stable conditions where IHO involvement is unwarranted. If this situation exists, our typology suggests that it is opportunism (perhaps in the sense that the host government has shifted obligations that they are able to fulfil to IHOs). However, it may happen that governments take an uncompromising stance with IHOs that choose to intervene instead. Future research could try to identify such cases and explore whether this could lead to the refinement or alteration of the proposed stances.

There are two other limitations that lead us to suggest further lines of inquiry for future research. First, although we were able to measure performance impact precisely in terms of lead-times and timeliness, we were not able to pin-point exactly the actions that have the most impact and the extent of that impact. Future research could employ more rigorous quantitative methods to establish the real extent to which identified host government actions impact on delivery performance. Second, although we were able to draw valuable insights by focusing on a Dunantist IHO, the decision to focus on a single IHO was also partly driven by the problems in accessing IHOs (Ehrenreich and Elliott, 2004). We expect that this does not fundamentally alter our proposed host

government stances but it might be worthwhile to establish if faith-based/religious IHOs or Wilsonian IHOs (i.e., those that have an inclination to work in close partnership with host governments) (Stoddard et al., 2009) perform better/ worse than Dunantist IHOs when dealing with governments who adopt each of the identified stances. Establishing the role of IHO identity in determining performance under varying host government stances may help to further improve humanitarian operations in a world where humanitarian space is shrinking.

Chapter 2 Appendices

APPENDIX I: Interview Protocol

General information about the respondent

May you tell me about yourself? Information sought:

- Name
- Educational background
- Years experience in humanitarian work
- Years experience working in case organisation
- Years/ months current/ last position held
- Past/ present roles and responsibilities within case countries

General questions

1. May you tell me something about the background and nature of the crisis in the (case) country?
2. What kinds of operations/ project does/did your organisation have in the country?
3. How would you describe the relationship between your organisation and the host government?

Facility location (FL)

1. In your time with the (case) organisation, how many times have you had to make FL decisions?
2. Describe the FL process as it has been carried out in the past
3. What challenges did you face in FL projects; (i) internally within the organisation and (ii) externally due to other factors/ stakeholders.
4. How much involvement did the government have in the process?
5. Are/ were there regulatory aspects to be dealt with in FL? Please state.
6. How predictable were the government requirements for FL? Please give examples.
7. Were there delays and/ or additional costs incurred due to government related issues? Please give examples.

Inventory management

1. Describe the inventory management process (from order placement to dispensing supplies to the end user).
2. Describe the warehousing set up within your projects (if respondent needs an example: e.g. how many warehouses/ storage locations, nature of goods stored in each).

3. What sort of considerations were/ are made inventory management decisions (if informant needs an example: e.g. determining the amount of safety stocks; number of storage locations; frequency of order placement)?
4. (If government related issues are not mentioned in 3) Is inventory management regulated by the government?
5. What influence does the government have on inventory management decisions/ related performance? Please give examples.
6. Are there differences in the way the government regulates or treats local purchases and international sourcing? Please give examples.
7. Are there any other ways in which the government affects inventory management that you can think of? Please elaborate.

Transport

1. Describe the transport, routing, and distribution process (If informant needs an example: e.g. in terms of planning)
2. What sort of considerations were/ are made in determining transport, routing, and distribution choices (If informant needs examples: e.g. the frequency of movement; the chosen routes; the manner in which supplies were/ are distributed to clinics/ patients/ warehouses)?
3. (If government related issues are not mentioned in 2) Is transport, routing, and distribution regulated by the government?
4. What influence does the government have on transport decisions/ related performance? Please give examples.
5. Are there differences in behaviour of local authorities as one moves from region to region? Please give examples.
6. Are there any other ways in which the government affects inventory management that you can think of? Please elaborate.

Other

1. Are there any additional issues that you can think of in terms of government actions/ behaviour that have (had) an impact on your job/ logistics in general?
2. In your opinion, what are the main reasons for the government behaviour/ decisions you have described?

*** **THANK YOU & END** ***

APPENDIX II: Respondent Information

Respondent number (R#)	Posting (where respondent)	Background	Total years experience	Position	Country Experience						Interviews per respondent	Duration of interview(s) (mins)
					U	V	W	X	Y	Z		
1	Field	Western	7	General logistics manager (country level)				✓			1	32
2	HQ	Western	25	General supply logistics manager				✓	✓		2	45
3	HQ	Western	6	Supply logistics manager (process-related matters)	✓	✓	✓	✓	✓	✓	6	52
4	Field	Western	10	General logistics manager (country level)				✓			1	105
5	Field	Non-western	15	General logistics manager (country level)			✓				1	69
6	Field	Western	19	General logistics manager (country level)	✓					✓	2	48
7	Field	Western	6	Project coordinator and general logistics manager (country level)				✓			1	24
8	HQ	Western	15	Supply logistics manager (tactical matters)	✓	✓	✓	✓	✓	✓	6	30
9	Field	Western	10	General logistics manager (country level)		✓			✓		2	41
10	Field	Non-western	20	Civil servant (country X) and general logistics manager		✓		✓	✓		3	66
11	Field	Western	25	General logistics manager (country level)		✓					1	21
12	Field	Non-western	14	General logistics manager (country level)						✓	1	42
13	Field	Western	19	General logistics manager (country level)		✓					1	34
14	HQ	Western	11	Manager technical logistics support to the field	✓	✓	✓	✓	✓	✓	6	67
15	HQ	Non-western	14	Manager general logistics support to the field		✓				✓	2	62
16	Field	Western	14	General logistics manager	✓	✓					2	64
17	HQ	Western	11	Manager general logistics support to the field			✓	✓			2	56
18	HQ	Western	8	Supply logistics officer (procurement)					✓	✓	2	33
19	HQ	Western	17	Head of emergency division	✓	✓	✓	✓	✓		5	54
20	Field	Non-western	6	Technical logistics manager (project level)					✓		1	52
21	Field	Non-western	6	Supply logistics manager (project level)					✓		1	16
22	Field	Non-western	11	Supply logistics manager (country level)					✓		1	29
TOTAL					# of respondents per country						# of interviews	Duration
					6	10	6	10	11	7	50	1042

Note:

1. The position generally refers to the respondent's position at the time of data collection. Most respondents will have filled a range of positions within the focal IHO over the years.

2. The project level is below the country level. Project-level respondents deal with operations within a geographic region in a country, whereas country-level respondents oversee projects and handle administrative and other tasks for all projects within a country.

APPENDIX III: Host Government Actions Impacting Logistics

Case	Delivery performance rankings ¹ LT, Ti	HOST GOVERNMENT ACTIONS		IMPACT ON DELIVERY PERFORMANCE	
		Challenging in relation to ² Log.F; Gov.Act.	Representative quotes from interview data	Decisions	Outcomes
U Civil war, medium severity	2, 3	None			
V Post war, low severity	1, 1	None			
W Civil war, medium severity	5, 5	IM; R	<i>Quantity restrictions on medical drugs</i> "In country W (...) we have to apply for import permits which is basically a quota system, you can request an import permit for so many pills..." (R#3)	How much to order (R#3, R#5, R#8)	
		IM; R	<i>International sourcing pre-approval, drugs</i> "You need import permits for every single medical product you bring into the country to be approved by the Ministry of Health - then you can order." (R#5)	Order cycle time (R#3, R#5)	Longer lead times (R#3, R#5, R#8) Compromised timeliness (Logical extension)
		T; R	<i>In-country visa requirements</i> "[If you want to visit a project you have to apply] 5 weeks in advance and they don't have guarantee on that... In one of our projects we have 8 locations where we work, if I mention that I want to travel to 3 places and they don't want me to go to one of those three places they will reject the whole application. Then they will ask you to apply again and it will take another 5 [weeks]..." (R#5)	Frequency of travel (R#5)	Longer lead times Compromised timeliness (Logical extension)
X Post insurgency, low severity	3, 6	IM; R	<i>(Near) maximum shelf-life on supplies</i> "... we had difficulties to live up to the requirements (...), they require an extraordinary remaining shelf-life on pharmaceuticals...." (R#2)	Order cycle time to match production cycles Supplier selection (Logical extension)	Longer lead times (Logical extension)
		IM; R	<i>Change in regulations: updated approved supplier list, lack of information</i> "But what became an issue is that these lists with items that were registered in country X were often obsolete, they were not updated etc... their information was limited and we really couldn't use it (R#2)	Supplier selection (R#2, R#4, R#8)	Longer lead times Compromised timeliness (R#1, R#2, R#3, R#4)
		IM; R	<i>Tight(er) control on international sourcing, limited local purchase options</i> "[In order to bring a product into country X, it] must be registered, the manufacturer must be validated, the importer must have an agency agreement with the manufacturer, and it must be a licensed importer. We do not meet any of these four requirements (...). [Local purchase] was a bit disappointing (...), they did not have their full range of products all the time which makes it sometimes more difficult." (R#4)	Supplier selection (R#2, R#4)	Longer lead times Compromised timeliness (R#1, R#2, R#3, R#4)
		IM; R	<i>Ambiguous importation rules, import authorisation process begins after supplies have been purchased</i> "... Pre-clearance could only be done after buying, but then some goods would be rejected but we still would not know what we need to get as a replacement." (R#3)		Compromised timeliness (Logical extension)
		IM; R	<i>New requirements for extra documentation</i> "Importation in country X is difficult, (...) especially the strict requirements on documentation to be satisfied (...)." (R#4)		Longer lead times (up to 6 months) (R#2, R#4, R#8)

1. See Table 1

2. Legend: (i) Log.F = logistics function related to IM = inventory management, T = transport; (ii) Gov.Act = host government action related to R = regulations, S = acts of sovereignty

Case	HOST GOVERNMENT ACTIONS			IMPACT ON DELIVERY PERFORMANCE	
	Delivery performance rankings ¹	Challenging in relation to ²	Representative quotes from interview data		
	LT, TI	Log,F; Gov.Act.		Decisions	Outcomes
X (ctd.) Post insurgency, low severity	3, 6	T; R, S	<i>Travel restrictions</i> "If you are operating in [the insurgency region] where transport is banned and the government is very much concerned that the goods are not falling into the hands of, well let's call it the rebels, then of course you have to register each transport and you have to submit a packing list and get security clearance and all these things (...). I would assume that this is standard operating procedure in a warzone. (...) But then, in the [insurgency] region (...), we were using another road which we negotiated access to and then after [a] security incident they [denied access to the road]." (R#7)	Routing (Logical extension)	Longer lead-times (longer routes) (Logical extension)
Y Political & economic crisis, low severity	4, 2	IM; R	<i>Statement of approval from local suppliers for alternative sourcing</i> "There was a problem with local market protection. We could only get permission [to import] if we could get a statement from 2 or 3 wholesalers that they don't mind." (R#3)	Supplier selection (Logical extension)	Longer lead-times (Logical extension)
		IM; R	<i>Customs pre-clearance</i> "[We need] approval for imports from [the local drug authority], if it's air cargo we wait but, if it is sea freight, we can send it already because we know we will get permission." (R#8)		Longer lead-times (mean 15 days) (IHNGO sourcing data)
Z Insurgency, high severity	6, 4	IM; R	<i>New requirements for extra documentation</i> "... So with country Z the paperwork is a nightmare. Also because they want things that we can't get here." (R#8)		Longer lead-times Compromised timeliness (Logical extension)
			<i>General changes in customs/ external sourcing regulations</i> "They have got their rules, but they are changing them, and this has influenced our importation which for me is now the biggest problem." (R#15)	Supplier selection (R#3, R#8, R#15)	
		T; R, S	<i>Travel restrictions</i> "In certain projects we were always assigned armed guards from the government so you were restricted: you have to make a plan, you have to leave at a certain time. Even individuals, in one project, for example, when you go out you always have an armed guard following you around all day." (R#6) "Most of the areas where we work are controlled for foreigners." (R#12) "(...) because of [attacks] in the past, you are not allowed to bring trucks into the city during daytime so we should find special locations where trucks can go so it's quite strict rules but based purely on security reasons so it's quite understandable." (R#15)	Frequency of travel (R#6, R#12, R#15)	Longer lead-times Compromised timeliness (R#6, R#15, Logical extension)

1. See Table 1

2. Legend: (i) Log,F = logistics function related to IM = inventory management, T = transport; (ii) Gov.Act = host government action related to R = regulations, S = acts of sovereignty

APPENDIX IV: Host Government Dependency

HOST GOVERNMENT DEPENDENCY						Overall Dependency on Focal IHO	
FINANCIAL POSITION AND AID			Corroborating evidence from interview data			Rating ^d	
GDP ¹	Source expenditure (Exp.) as % of total health-care expenditure ²	Other External sources	Exp. Ranking ³	Representative quotes related to host government dependency on focal IHO		Low	
Case	Host government	Focal IHO	External sources	Exp. Ranking ³	Corroborates financial data? Yes, notably regarding low GDP. The impact of resource limitations on delivery performance is stated. However, the prevailing view is that abundance of external funding is exploited for personal gain rather than treated/ perceived as much needed help.		
U Civil war, medium severity	5.6	1.2	43.7	3	<p>"The bulk of your logistical problems in country U are probably related to complications in infrastructure and difficulties in managing the accountability of resources, stocks, finance, in relation to staff management." (R#19, statement on resource limitations)</p> <p>"The thing is also the (...) officials are making a lot of money from this NGO business. It's quite an established economy in a way, you know, like even these bribes or whatever that are paid to customs officials (note: this is not in particular reference to the focal IHO), they know exactly what they can ask for and know that people will pay because otherwise they will have penalties that will be much much higher (...)." (R#16, statement on exploitation)</p>		Low
V Post war, low severity	14.2	4.3	23.2	2	<p>Corroborates financial data? Yes.</p> <p>"They try to play a strong state but they aren't because they don't have infrastructure and they know that without [this IHO] they can't do anything. We are not a drop in the ocean, we are a serious player." (R#15)</p>		High
W Civil war, medium severity	10.9	3.5	8.1	1	<p>Corroborates financial data? Partially, only for high GDP. The significant contribution of the IHO to healthcare provision is highlighted but interpreted as a lack of political will rather than as a high dependence on the focal IHO. Thus country W's expenditure ranking as most dependent is not supported by qualitative data.</p> <p>"Currently the people needing to be on ARV is [estimated to be more than 100,000]. Out of those, only [33%] get HIV treatment. Of the [33%, 65%] of them are under our care. So it is only [35%] that the rest of the country (the host government) is covering. So you could see that how much of the load we're carrying in there." (R#5, statement on IHO contribution)</p> <p>"What we are trying to cover is not about the lack of boxes of drugs, it's not a lack of doctors (...) if there was a political will we wouldn't need to be there (...). It's a rich country, they have enough resources, including the most important resource (...) capable skilled manpower." (R#5, statement on lack of political will)</p>		Low

HOST GOVERNMENT DEPENDENCY					Overall Dependency on Focal IHO
FINANCIAL POSITION AND AID					
Source expenditure (Exp.) as % of total health-care expenditure ²					
GDP ¹	Host governm- ent	Focal IHO	Other External sources	Exp. Ranking ³	Rating ⁴
Case					
X	High	4.2	46.7	4	Low
Post insurgency, low severity		0.5			"Country X has the reputation that it is quite a complex environment to work in partially as a result of the [host] government (...) being a strong state or an ever stronger state." (R#4)
Y	Low	-	-	-	High
Political & economic crisis, low severity		Absolute expend- iture similar to country X			"Corroborates financial data? Yes, but this is solely based on GDP data." "Reasons [for refusing IHO assistance in certain instances] are that they are capable, very capable, they have capable manpower and everything. (...) When they see that it's uncontrollable that's when they will start asking for your help (...)." (R#22)
Z	High	25.8	5.6	5	Low
Insurgency, high severity					"Corroborates financial data? Yes." "We are a small fish, we can't even change the regulations." (R#12)

1. Derived from World Bank and Trade Economics data. Low GDP: belongs to bottom 90 countries in terms of GDP; High GDP: belongs to top 90 countries

2. Deduced through a combination of various data sources, namely data from the World Bank, Trade Economics, WHO, and focal IHO financial reports

3. Host government dependency on focal IHO taking into account expenditure from other external sources. Ranges from 1 (most dependent) to 5 (least dependent). Dependency for Y could not be reasonably determined from the various data sources. Hence it was omitted from the rankings.

4. Based on corroborated evidence from financial position and support data and calculations (left hand side of the table) and interview data presented on the right hand side of the table.

APPENDIX V: Evidence of Tensions Between Interests

Case	HOST GOVERNMENT INTERESTS	
	Evidence of tension between interests?	Representative quotes
U Civil war, medium severity	No/ latent.	
V Post war, low severity	No/ latent.	"They don't obstruct, or they don't obstruct yet. The need for NGOs is obvious, or they simply lack the capacity to obstruct NGOs." (R#19)
W Civil war, medium severity	Yes. Endemic to the emergency and coupled with marginalisation along ethnic lines. IHO assistance to marginalised populations not desired.	"[These people] are systematically oppressed (...). There is a lot of hostility from the other ethnic groups which clearly shows that the NGOs and the UN are the ones who actually enable this group to survive. If the NGOs would not be there this group would not have survived there so, when they say like they want all NGOs to be out (...). And to make matters worse, the government (...) thinks that these people don't belong there and maybe the only potential solution is to expatriate them to another country but nobody wants them." (R#5)
X Post insurgency, low severity	Yes. Endemic to the emergency, IHO activity in post-insurgency areas not desired.	"In certain areas we were clearly blocked and in certain areas they were actually glad we were there (...). They tried to control our access so that they can dry out the population (...)." (R#7)
Y Political & economic crisis, low severity	Yes. Occasional, notably reported during election period. IHO activity generally desired but on host government's terms.	"Sometimes you go to an area but you are blocked, the government will tell you where to go and what to do (...). Sometimes you go in freely, you are called in to help." (R#22) "(...) their idea is if you are helping, then help, but also giving a capacity for the people that are there to grow (...) because they always ask you, what if you go, then what do we do?" (R#21)
Z Insurgency, high severity	Yes. Endemic to the emergency. IHO activity in insurgency areas not desired.	"It depends on where you work and what you do in country Z (...). We couldn't get [official (NGO) registration] for many years because we wanted to work in some sensitive, for country Z, places (...) and I know that when we removed one item from our MoU (memorandum of understanding) we were registered. But in the end we were still working around this area because it's a bit of a political sensitive issue, it's a fight for independence (...)." (R#15)

CHAPTER 3

Unravelling Supply Network Resilience Lessons from Extreme Situations in Humanitarian Operations

Abstract

Drawing on the complex adaptive systems (CAS) theory concepts of internal mechanisms, the environment, and co-evolution, this research investigates supply network (SN) resilience. A mixed-methods longitudinal case study approach, incorporating a quantitative study (Study I) and a follow-up qualitative study (Study II), is employed. In Study I, we conduct an econometric analysis to investigate the extent to which the nature of an adverse event, in terms of predictability and magnitude, influences the disruptive impact at the node and SN levels. We find that disruptions occur when unforeseeable events strike but are averted - with delivery performance even improving - when foreseeable events occur. For the overall SN, findings are mixed; performance outcomes may be similar to the those of the affected node or be the opposite. In Study II, we conduct semi-structured interviews to seek explanations for these findings. We establish how SN members interact via internal mechanisms during preparation for, and response to adverse events, and co-evolve with each other and the environment. This study makes key contributions regarding cause and effect in CAS and proposes pre-emptive schema for SN members to employ, considering the nature of an adverse event, in order to be resilient over time.

Keywords: supply network resilience, delivery performance, complex adaptive systems, schema, disruption, adverse event

3.1 Introduction

The Rana Plaza factory collapse in 2013, Hurricane Dorian in 2019, and the COVID-19 pandemic are examples of adverse events that have caused disruptions that severely impacted the performance of organisations and their supply networks (SNs) in recent history. As interconnectedness in SNs renders such adverse events a threat to the continuity of operations across multiple organisations, members of a SN frequently have to adapt their behaviour and/ or structures to ensure survival (Craighead et al., 2020; van Hoek, 2020; Zhao et al., 2019). They do so by scanning the environment for possible adverse events and establishing schema that define the strategies and procedures regarding how they interact in response, among others (Dooley, 1996; Pathak et al., 2007). This allows a network to be resilient, i.e., have the adaptive capability to prepare for, and respond to, disruptions (Ponomarov and Holcomb, 2009), and co-evolve with the environment to secure survival (Tukamuhabwa et al., 2015; Walker, 2020).

As SNs are complex adaptive systems (CAS), resilience is a system property resulting from simultaneous and parallel employment of schema by different members of the SN (Choi et al., 2001; Nair and Reed-Tsochas, 2019). The overall effect of network members' interactions can be synergistic, enabling good overall network resilience, or conflicting, leading to detrimental effects for the network (Blackhurst et al., 2011; Pettit et al., 2013; Tukamuhabwa et al., 2017). Therefore, SN resilience is not simply the sum of individual members' resilience (Choi et al., 2001; Pettit et al., 2013; Wycisk et al., 2008). Furthermore, different adverse events pose different threats to the SN implying that the extent of their impact also inherently differs (Tukamuhabwa et al., 2015). Thus, network members need to consider the nature of an event, in terms of its predictability and magnitude, when establishing schema that enable resilience (Ambulkar et al., 2015; Bode et al., 2011). Member interactions further imply that the nature of an event and the corresponding disruption impact are not necessarily linked (Choi et al., 2001; Day, 2014; Tukamuhabwa et al., 2015; 2017) and that node-level disruptions do not necessarily lead to network-level disruptions (Kim et al., 2015). Consequently it is difficult to predict the disruptive impact of adverse events at the network level (Chiva et al., 2010).

A network level perspective incorporating considerations of the nature of an event and the wider environment is needed in order to develop a more holistic and accurate

understanding of SN resilience (Day, 2014; Kim et al., 2015; Nair and Reed-Tsochas, 2019; Tukamuhabwa et al., 2015). Unfortunately, difficulties in obtaining SN level data have generally compelled empirical researchers to investigate resilience at the organisational level and then project findings to the SN level (c.f. Martins de Sá et al., 2019; Zhao et al., 2019). Simultaneously, how SNs co-evolve with the environment, from which adverse events originate, and with each other to build network resilience to different threats has rarely been investigated (Hearnshaw and Wilson, 2013; Martins de Sá et al., 2019; Zhao et al., 2019). In general, there is a need for research that establishes a better understanding of emergent behavior in CAS (Nair and Reed-Tsochas, 2019). Therefore, this research seeks to demystify SN resilience by exploring two key lines of inquiry from a CAS perspective. First, to what extent does the nature (predictability and magnitude) of an adverse event influence the disruptive impact at the place of occurrence (node level) and at the network level? Second, how are the performance impacts at both levels related to network member interactions during preparation for, and response to adverse events and their co-evolution with each other and the environment?

We employ a mixed-method longitudinal case study approach to address the complexity and multidimensionality of SN resilience (Ali et al., 2017; Pettit et al., 2013; Wieland, 2021) and to accurately assess performance outcomes and network member interactions at the node and network level (Pathak et al., 2007). We use the humanitarian sector as the research setting because the relatively more frequent exposure of humanitarian SNs to adverse events presents a natural opportunity to learn about SN resilience (Day et al., 2012; Holguín-Veras et al., 2012; Kovacs and Falagara Sigala, 2021; Scholten et al., 2014).

Drawing on CAS theory, our research makes three major contributions to the literature. Firstly, we contribute new insights on the link between cause and effect in SNs with respect to resilience. To the best of our knowledge, this is the first study to use an objective measure of the disruptive impact of adverse events, namely delivery performance. Existing empirical research has mostly used self-reported subjective and/ or qualitative performance measures (Hohenstein et al., 2015; Melnyk et al., 2014; Tukamuhabwa et al., 2015). Our approach also enabled us to reliably establish the disruptive impact of an event at both the network level and at the place of event occurrence (node level). In line with existing literature (e.g., Tukamuhabwa et al.,

2015), we find that unpredictable adverse events lead to a drop in performance at the node level. However, surprisingly, we find that performance at the node level can be sustained or even improved when adverse events are foreseeable. For the overall SN performance, findings are more mixed; performance outcomes can be similar to those at the affected node-level or opposite. The cause for the effects can be explained by the joint effect of network member interactions in the context of the event's occurrence, i.e., contextual embeddedness (Tukamuhabwa et al., 2017) as well as additional SN inhibitors and facilitators. Secondly, we contribute insights on adaptive behaviour with respect to resilience at the SN level, a so far underexplored aspect of CAS (Nair and Reed-Tsochas, 2019). In particular, we zoom in on how network members interact and co-evolve with each other and with the environment during preparation for, and in response to, adverse events. Third, considering the nature of an event in terms of predictability and magnitude we are able to derive pre-emptive network level schema that allow members of a SN to jointly and strategically prepare for, and respond to, threats to ensure network continuity and survival (Christopher and Peck, 2004; Zhao et al., 2019).

3.2 Literature Review: Resilience and Complex Adaptive Systems

Resilience is as an important SN property enabling adequate response to the disruptive effects of adverse events and ensuring survival (Pettit et al., 2019; Sheffi and Rice, 2005; Walker, 2020; Wieland and Durach, 2021). It is a SN's capability to adapt to environmental threats by preparing for disruptions (i.e., interruptions in the normal flow of goods and services) within (parts of) the network, responding to, and recovering from them while maintaining continuity of operations (Craighead et al., 2007; Jüttner and Maklan, 2011; Ponomarov and Holcomb, 2009). Extant literature has mainly focused on outlining strategies that build SN resilience such as increasing flexibility (e.g., by using modular product configurations), creating redundancy (e.g., by having buffer inventory and/ or back-up suppliers), improving agility (e.g., by supply chain integration), and forming collaborative relationships (e.g., Brandon-Jones et al., 2014; Martins de Sá et al., 2019; Tukamuhabwa et al., 2015; Zhao et al., 2019).

As SNs are CAS consisting of groups of interconnected autonomous organisations that engage in complex processes and activities in response to changes in both the environment and the system of entities within it (Choi et al., 2001; Kim et al., 2015;

Pathak et al., 2007; Zhao et al., 2019), understanding SN resilience requires further considerations that capture the complexities and the emergent behaviour of the network (Tukamuhabwa et al., 2015; Walker, 2020). Earlier research uses three key concepts in CAS theory that are also relevant for research on SN resilience (Choi et al., 2001; Nair et al., 2016; Pathak et al., 2007). Firstly, *internal mechanisms* require studying member interactions rather than individual member actions and decisions to gain insights on SN resilience (Ali et al., 2017). This is because in CAS, decisions made by one member of the network can affect subsequent decisions of other members (Sting et al., 2019). An organisation might, for example, decide on its level of redundancy based on the resilience strategies employed by its suppliers. Secondly, the *environment* from which different types of adverse events stem, impacts individual network members and the overall network (Tukamuhabwa et al., 2015). The predictability of an adverse event can also have implications for the response (Gunasekaran et al., 2015; Namdar et al., 2018), for example, create ambiguity about the value and utility of redundancies (Ambulkar et al., 2015). Investments in redundant resources can potentially tie up and absorb financial capital, while the adverse event might never happen (Brandon-Jones et al., 2014). Thirdly, *co-evolution* between the environment and a SN results from SN members efforts to prepare and respond to different adverse events and learning over time (Tukamuhabwa et al., 2015). This in turn has implications for the different resilience strategies employed. Hence, SN resilience is a system property that needs to be cultivated and maintained over time (Seville et al., 2015).

While the relevance of internal mechanisms, the environment and co-evolution for studying SN resilience is apparent, resilience research to date has not systematically researched their implications for network resilience. In line with the aim of this study, we focus on the node and network level effects of adverse events and explanations of the performance outcomes drawing on these three CAS concepts.

Internal Mechanisms

Internal mechanisms in CAS relate to schema that guide network member interactions and decision-making (Nair et al., 2016; Pathak et al., 2007). Schema include strategies and procedures that determine how network members interact in preparation for, and response to, environmental changes (Choi et al., 2001; Pathak et al., 2007; Tukamuhabwa et al., 2015). Member interactions involve the exchange of information

and/ or resources (Dooley, 1996) to ensure identification, anticipation, reaction and adaptation to adverse events (Urciuoli et al., 2014; Wieland and Durach, 2021).

The high level of interdependency in SNs means that each network member's actions can influence the overall resilience of the SN (Surana et al., 2005; Tukamuhabwa et al., 2017). Because individual members face different constraints and have different functions, goals, and action patterns (Wycisk et al., 2008), the sum of their interactions emerges over time without any centralised control and can be synergistic or conflicting (Blackhurst et al., 2011; Pettit et al., 2013; Surana et al., 2005). The latter implies that network-level disruptive outcomes may be negative despite individual members' self-organising efforts to avert the disruptive effects of adverse events (Tukamuhabwa et al., 2015). Thus, to enhance a SN's resilience, its members should be collectively capable of creating novel solutions and learning, so that they can adapt their schema to fit prevailing environmental conditions (Chiva et al., 2010; Day, 2014). Martins de Sa et al. (2019), for example, find that collective schema for response to unforeseeable adverse events should emphasise downstream activities. By so doing, network members create a portfolio of capabilities that help to respond to, or avoid, disruptions (Pettit et al., 2013).

The Environment

The environment is rugged and dynamic and network members must adapt to changes in the interpreted and enacted environment in order to survive (Nair and Reed-Tsochas, 2019; Tukamuhabwa et al., 2015). Changes can be imposed by adverse events originating within the SN (e.g., plant fires, bankruptcy of a member) or externally (e.g., currency fluctuations, and catastrophes) (Kleindorfer and Saad, 2005). Different types of adverse events pose particular threats to the SN and, therefore, require different preparation and responses from network members (Ambulkar et al., 2015; Bode et al., 2011). Furthermore, the extent of their impact on a SN also inherently differs (Tukamuhabwa et al., 2015). Specifically, the nature of an event in terms of predictability and magnitude have direct implications for outcomes (Christopher and Peck, 2004; Kim et al., 2015).

Unforeseeable and/ or high magnitude events tend to have a serious disruptive impact (Christopher and Peck, 2004; Craighead et al., 2020; Kim et al., 2015; van Hoek, 2020). In addition, contextual embeddedness in terms of political, cultural, and

territorial attributes of a SN's environment is highly influential as these attributes constitute its interpreted and enacted environment (Tukamuhabwa et al., 2017). For example, the 2010 Haiti earthquake was a relatively weak earthquake (magnitude 7 on the Richter scale), but led to an estimated 316000 deaths. In the same year, Chile was struck by an earthquake at least 350 times stronger (magnitude 8.8) where significantly less people were killed (around 525). The difference in impact is linked to two main contextual features: firstly, the Chilean earthquake's epicentre was at an area with a very low population density, whereas Haiti's was close to a densely populated area; and secondly, unlike Haiti, Chile had taken preparedness measures for earthquakes. Thus, the immediate impact of the earthquakes was arguably more related to the contexts of occurrence than the unpredictable nature of earthquakes (Tatham and Pettit, 2010). To achieve SN resilience, therefore, network members have to match their preparation and response schema to both the nature of an adverse event and the environment in which (part of) the network is embedded (Tukamuhabwa et al., 2015; 2017).

For clarity, in this study, we project the definitions by Ellis et al. (2010) to the network level, and also separate the magnitude of an adverse event and its disruptive impact. Accordingly, we define disruptive impact as the performance effect of an adverse event at the node or network level, probability as the likelihood that a specific adverse event will occur, and the magnitude as the direct consequences of the actual event at the place of occurrence independent of its disruptive impact (e.g., the extent of damage or number of people affected).

Co-Evolution

SN members jointly attempt to fulfil customer demand through individual actions while making adaptations to accommodate changes from the environment and actions of other members through the process of coevolution (Choi et al., 2001; Day, 2014; Pathak et al., 2007). Simultaneously, co-evolution may in itself lead to new changes in the SN and its environment (Nair and Reed-Tsochas, 2019; Surana et al., 2005; Tukamuhabwa et al., 2015). Because interactions among network members and between the environment and network members are dynamic, changes tend to be nonlinear with respect to the original change in the network (Pathak et al., 2007). Hence, typically, there is a constant need for adaptation in the SN (Pettit et al., 2019; Surana et al., 2005). This implies that SN schema have to change over time in order to

enable appropriate responses to adverse events (Tukamuhabwa et al., 2015). Accordingly, it has been highlighted that SN resilience is an ongoing effort rather than a one-time activity (Seville et al., 2015) and that a resilient SN inherently evolves (Tukamuhabwa et al., 2015; Walker, 2020; Wieland, 2021). This implies that resilience is an emergent system property of a CAS resulting from the interactions between network members and the environment as they co-evolve (Nair and Reed-Tsochas, 2019).

In summary, we draw on the key CAS concepts of internal mechanisms, the environment, and co-evolution to generate empirical insights on SN resilience. To achieve this aim, we investigate the extent to which the nature of an adverse event, in terms of magnitude and predictability, influences the disruptive impact at the place of occurrence (node level) and the network level. Furthermore, we seek explanations for the outcomes at both levels by investigating how network members' interactions during preparation for, and response to, adverse events lead to co-evolution over time and contribute to the ultimate disruptive impact of different adverse events.

3.3 Methodology

A case study approach was adopted to explore the complex and elusive phenomenon of SN resilience within its context (Eisenhardt, 1989). More specifically, we adopted a mixed-method case study approach incorporating a quantitative study (Study I) and a follow-up qualitative study (Study II) to improve triangulation, complementarity, and expansion of findings leading to less biased and more holistic insights than single method approaches (Boyer and Swink, 2008; Singhal et al., 2008). In Study I, we performed an econometric analysis to assess the disruptive impact of adverse events on a SN, at node and network levels over a period of 18 months. In Study II, we conducted in-depth semi-structured interviews to validate, and seek explanations for, the results obtained in Study I. Using both studies within the case study approach allowed us to longitudinally investigate resilience in a SN, which is essential for the understanding of continuous adaptation and counter-adaptation that lead to co-evolution between the SN and its environment (Tukamuhabwa et al., 2015).

Research Setting

Humanitarian SNs have to deal with adverse events more regularly than other organisations and can therefore be considered experts at dealing with risks and

building resilience (Day et al., 2012; Kovacs and Falagara Sigala, 2021; Scholten et al., 2014). This is in line with observations that some of the most significant contributions to management theory emerged from extreme or “unusual” contexts (Bamberger and Pratt, 2010). At the same time, however, while most of humanitarian supply chain management research focuses on disasters (e.g., Holguín-Veras et al., 2012), only three percent of disasters are sudden-onset and hence require a SN response under extreme time pressure (Van Wassenhove, 2006). Consequently, the majority of humanitarian work actually relates to slow onset disasters that have a high predictability due to, e.g., seasonality, or protracted crises (i.e., operations in long-term crises situations like civil war). This naturally entails the setup of long-term and stable SNs that are threatened by sudden onset disasters similar to SNs in the commercial sector (e.g., the impact of the earthquake in Japan in 2011 on global commercial SNs that were connected to Japan). Hence, humanitarian SNs operate in a compelling context to study SN resilience as they are typically long-term (similarly to commercial SNs) while at the same time being more frequently exposed to adverse events that occasionally exert pressure on the existing SNs.

We study a medically-oriented humanitarian SN. The selected humanitarian SN is global and, as of 2010, had over three decades of exposure to the full range of adverse events that are experienced in the humanitarian sector: natural and man-made disasters with either a sudden or slow onset (Van Wassenhove, 2006). The general setup of the SN under study is depicted in Figure 1. There is an interface organisation that coordinates activities among the network’s 208 suppliers (ranging from product developers and manufactures to wholesalers and retailers) and its end-customers (i.e., countries of operation). Most upstream operational activities like planning, supplier selection, purchasing, and transport are conducted from Europe by the interface organisation. A 3PL provider is responsible for the transport of goods from suppliers to the end-customers. The interface organisation is the supply unit of an international humanitarian organisation (IHO) based in Europe. It serves the IHO’s end-customers who are spread out across Africa, Asia, Central and South America, the Middle East, Europe, and Oceania organised in six processing portfolios. Each portfolio is handled by an individual; composition of the processing portfolios is based on various factors such as environmental complexity in terms of bureaucratic requirements that end-customers face from host governments and stability of demand to even out workload.

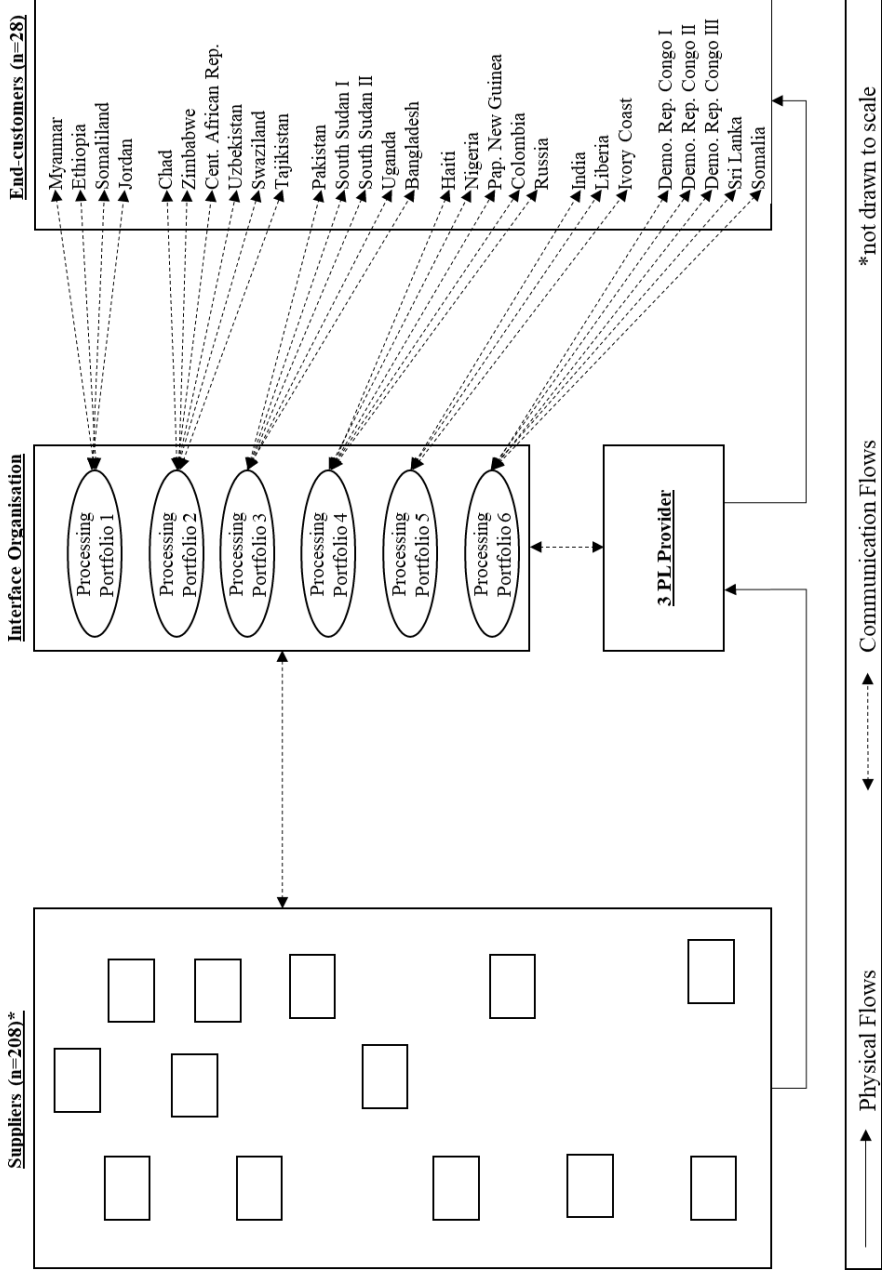


Figure 1: Basic set-up of the case SN

Over 90% of the SN members (upstream and downstream) have been part of the network for over 20 years, giving evidence of the stable and long-term modus operandi of the SN.

Case Selection

Within the chosen SN, we selected four adverse events from 2010 based on magnitude and predictability (Figure 2) and investigated their impact on the network's ongoing operations in both Study I (econometric analysis) and Study II (semi-structured interviews). We chose an embedded case study approach to control for several factors that also influence the ultimate impact of adverse events, e.g., SN structure (Hearnshaw and Wilson, 2013; Kim et al., 2015) and selected events that were external to the SN to ensure that they were inevitable and not directly within the control of the SN (Kleindorfer and Saad, 2005).

We selected four events in the year 2010 as one of the worst years in terms of humanitarian crises in recent history and an exceptional year for the SN in terms of demand spikes and associated operational costs (Appendix I). We applied theoretical replication based on the nature of the adverse events, expecting that varying magnitude (in terms of number of people affected and destruction to infrastructure - which are often correlated) and predictability (Holguín-Veras et al., 2012) will require different ways of adaptation in the network to maintain performance. The selection of four cases also fit the recommended range of 4 to 10 cases for theory building research (Eisenhardt, 1989a).

Magnitude	High	<p><i>Earthquake Case (Haiti)</i></p> <ul style="list-style-type: none"> ● Difficult to predict ● Response duration: 12 months ● Fatalities: >> 100,000 ● Number of people affected: >> 1 million. 	<p><i>Floods Case (Pakistan)</i></p> <ul style="list-style-type: none"> ● Seasonal ● Response duration: 4 months ● Fatalities: ≈ 2,000 ● Number of people affected: ≈ 20 million
	Low	<p><i>Cholera-H Case (Haiti)</i></p> <ul style="list-style-type: none"> ● Cholera never occurred in Haiti before ● Response duration: 3 months ● Fatalities: ≈ 3,900 ● Number of people affected: ≈ 185,000 documented cases 	<p><i>Cholera-C Case (Chad)</i></p> <ul style="list-style-type: none"> ● Seasonal ● Response duration: 4 months ● Fatalities: ≈ 180 ● Number of people affected: > 6,000 documented cases
		Low	High
		Relative predictability	

Figure 2: Basic details of the selected adverse events

Study I (Econometric Analysis)

Scope, Data Sources and Description

Since the real-life SN is vast, it was necessary to set analysis boundaries for palpability and tractability (Kim et al., 2015). In terms of the downstream network of the interface organisation, the four selected adverse events happened to three end-customers belonging to three different processing portfolios (Processing Portfolio 2, 3 and 4 – see Figure 1). To learn about resilience at the network level, we followed the recommendation to consider multiple end-customers when assessing the disruptive impact of adverse events, including those not directly experiencing the adverse event (Melnyk et al., 2014; Spiegler et al., 2012). Hence, a fourth processing portfolio (Processing Portfolio 1) was added with end-customers that did not experience an adverse event as a base portfolio against which performance within the affected portfolios was compared. The end-customers were treated as separate members of the SN because they are geographically dispersed and vary in terms of how they are set up and the characteristics of the environments in which they are embedded. Upstream of the interface organisation all 208 suppliers were included in the data analysis. These choices allowed us to include all critical members of the network.

We used data and information from seven sources to construct a database. The main data source was the SN's transactional data from over 200 projects in 28 countries of operation (i.e., end-customers of all six processing portfolios) obtained from the interface organisation. The basic unit of observation is an order line with a wealth of information, including the date at which the order was received by the interface organisation; when and to which supplier the order was routed or picked from stock; when the supplier delivered to the 3PL provider; the date on which it was shipped; when it was received by the end-customer; and whether the item has any special characteristics (e.g., cold chain or hazardous). In the initial phases of the study, the first author spent time with an expert in the interface organisation (second data source) to understand the logic and set up of the main data source as well as to identify and incorporate additional potentially relevant variables. Consequently, an initial set of 22 variables was developed. Six variables were later added in an iterative step based on information provided during the semi-structured interviews (third data source). Three of these variables were derived from the main data source while four additional data sources were used for the remaining three: the global report of state fragility

indices for the year 2010 - to establish state fragility; the United Nations country grouping¹ - as a guideline for determining the geographic regions, hence spatial proximity; ConflictMap and BBC news for establishing the response setting (conflict, post-conflict, or other) in the countries of operation prior to the adverse event. The 28 variables that were ultimately identified are presented in Appendix II.

The chosen period of analysis is October 2009 to March 2011 with a total of 29,981 order lines. While the actual year of interest is 2010 (i.e., when the adverse events occurred), the periods before and after 2010, i.e., September to December 2009 and January to March 2011, were included to better assess the impact of the adverse events on the long-term operations within the SN.

Measures

Dependent variable (delivery performance): We operationalised the disruptive impact of an adverse event as the delivery delay (in days) to the network's end-customers because they are the most affected by disruptions (Melnik et al., 2014). The disruptive impact would, in turn, reveal the level of resilience of the SN relative to each adverse event. We chose to use the difference between the actual date of shipment by the 3PL provider and the scheduled date of shipment from the 3PL provider as a proxy for the delivery delay because data on actual delivery dates to the end-customers were deemed not reliable enough by the expert in the interface organisation (second data source). This, however, had the benefit of reducing the complexity of our research set-up as it eliminated the need to further control for factors affecting last mile delivery outcomes, e.g., the level of insecurity and terrain ruggedness.

As one of our main objectives was to better grasp the extent of the disruptive impact of an adverse event from point of origin to the wider network, we distinguished between node-level and network-level delivery performance. At the node level, delivery delay was measured as the unweighted average delay each end-customer experienced (i.e., at the country level), and at the network level as the unweighted average delays over all countries in the four chosen portfolios. T-tests were conducted to compare delivery performance during the response phase versus otherwise (i.e., before and after the response combined).

¹ Source: <http://www.internetworldstats.com/list1.htm>, Accessed on 31 May, 2019.

Independent variables (network versus node-level effects): The two main independent variables were dummy coded and capture the timing of the response to each adverse event (1 if there is an ongoing emergency response to an adverse event, 0 otherwise) and the country of occurrence of the events respectively (Appendix II).

Control variables: The variables “supplier ranking” in terms of the share of order lines a supplier receives in the analysis period and “3PL provider” in terms of the processing times of the 3PL provider, measured in days, were included to establish the significance of SN members for SN resilience. We also controlled for proximity, both spatially (based on geographical region) and virtually (based on the interface organisation’s processing portfolios as shown in Figure 1), as these can influence the extent of the disruptive impact of adverse events (e.g., Christopher and Peck, 2004; Kim et al., 2015; Pettit et al., 2013). The other control variables were, broadly speaking, concerned with product characteristics, order-related aspects, and the operational context downstream as these can impact delivery performance (Dube et al., 2016; Pedraza-Martinez and Van Wassenhove, 2013).

Assumptions and Diagnostic Checks

Diagnosis of sampled data showed that there were issues with multi-collinearity (variance inflation factor, $VIF > 10$; and Pearson correlation > 0.9), missing observations (which could not be reliably estimated), and multivariate outliers (Mahalanobis D^2 probability ≤ 0.001). These three issues were resolved by dropping problematic observations (about 7%) and two of the 28 variables (see Appendix II). As we expected that adverse events would cause performance fluctuations within the SN, we wanted to include outliers from the analysis; they would not be due to error but a reflection of the impact of the events. Thus, when diagnosis of the sampled data revealed that the OLS assumptions (Osborne and Waters, 2002) were violated for normality (Shapiro-Wilk test, $W = 0.827$, $p < 0.001$), homoskedasticity (White’s test, $\chi^2_{14} = 883.41$, $p < 0.001$), and linearity we did not seek to address this. Instead, we employed a robust regression method to avoid the loss of valuable observations using the MM-estimator (e.g., Susanti et al., 2014; Yohai, 1987) which can handle a large proportion of outliers before accuracy is compromised.

Study II (Semi-structured Interviews)

Data Collection

Having determined the extent to which the nature of an event influences the disruption impact in the quantitative study, we wanted to understand how network members interact during, and created schema for, preparation and response to the adverse events leading to the realised outcomes. For the semi-structured interviews, we selected three critical suppliers: supplier 1 and 3 because they are part of the top ten suppliers in terms of volume, and supplier 2 because this is a reliable supplier that is known for its flexibility and problem-solving. With guidance from the expert in the interface organisation, knowledgeable informants were selected in each of these organisations (Table 1). Furthermore, the interface organisation and the 3PL provider were identified as critical members to be interviewed. We conducted ten interviews with twelve individuals (in two instances, two respondents chose to be interviewed jointly). The interviews lasted 67 minutes on average and ranged between 21 and 150 minutes. The interview protocol (Appendix III) was developed primarily based on the results of Study I and to understand member interactions in preparedness and response to events in 2010 specifically and in general. Most questions focused on each member's involvement and experience in the preparedness and response phases for each of the adverse events. All interviews were audio recorded and transcribed for analysis while paying attention to confidentiality and anonymity requirements.

Data Analysis

We conducted a qualitative content analysis on the data (Miles and Huberman, 1994). In the first coding step, all data were coded descriptively for "member interactions". We explicitly linked these to resilience by categorising them as interactions during preparedness and/ or response and labelling them in relation to identification, anticipation, reaction, and adaptation to incidents (Urciuoli et al., 2014). In the second coding step, we established links between the nature of an event (predictability and magnitude) and member interactions through an iterative process, also seeking to establish how they co-evolved with each other and with the environment. We developed inductive codes for three emerging themes that helped to refine insights into these aspects.

Table 1: Semi-structured interview background information

	Interface org.	Supplier 1	Supplier 2	Supplier 3	3PL
Founded	1984	1989	1983	1972	2004
HQ	Europe	Europe	Europe	Europe	Europe
# of country offices	1	2	1	45	77
Type	Non-profit	Commercial*	Commercial	Non-profit	Commercial
Clientele	Worldwide	Non-profit	Non-profit	Non-profit and for-profit SMEs	For-profit and non-profit
Ranking: # of order lines, goods value	N/A	Top 10, Top 10	Top 10, Top 20	Top 10, Top 10	N/A
# of interviews	4	1	1	2	2
Interviewees	<ul style="list-style-type: none"> Procurement coordinator (Manager 4) Procurement Process Officer (Manager 5) Head of Emergency Support (Manager 6) Tactical Operational Procurement Officer (Manager 7) 	Deputy director facility (Manager 8)	Owner & General Manager (Managers 9 & 10)	<ul style="list-style-type: none"> Logistics and Supply Chain Manager (Manager 11) Regional Manager (Manager 12) 	<ul style="list-style-type: none"> Branch Manager & Warehouse, Transport and Security Manager (Managers 1 & 2) Team Leader – Imports (Manager 3)

* Registered as a commercial organisation but functions as a not-for-profit organisation

Firstly, as the analysis progressed, we observed that anticipating other SN members' actions and choices was just as important as the ability to anticipate incidents during the preparedness for an event. Thus, we further distinguished anticipation to include not just incidents, but also potential member actions at, or after, the onset of an adverse event as part of internal mechanisms.

Secondly, it became apparent that several schemata (internal mechanisms) determine how members interact in preparation and response to the events. These were important in determining resilience and were related to specific *roles* of individual members during the preparedness phase, as well as flexibility in executing them in the response phase. As a result, we developed codes in relation to schema to include role definition, role clarity, role assignment, and role floating in the preparedness phase as well as role enactment, role re-assignment and role exploration in the response phase. Role floating was for roles that were identified in the preparedness phase but not assigned until the response phase. Typically, it became clear in the response phase which member was in the best position to assume that role. Therefore, having floating roles enabled the capacity for rapid co-evolution as the situation would unfold. Still in the response phase, pre-assigned roles were sometimes re-assigned to the best suited member once the adverse event had occurred (role re-assignment) and unforeseen but necessary roles were explored and assigned (role exploration). Hence, examples of role re-assignment and role exploration gave evidence of how the network members co-evolved with each other and with the environment as the adverse events unfolded.

Thirdly, it emerged that there are more changes in the enacted and interpreted environment (e.g., the response setting), but also within the SN itself (e.g., an ongoing IT upgrade) that positively or negatively affected performance beyond the nature of the event. We labelled those with a negative effect as "inhibitors" and those with a positive effect "facilitators" regardless of whether they originated internally, within the SN, or externally. These inhibitors and facilitators were also drivers of co-evolution as both entailed responding to prevailing relevant environmental conditions. Therefore, co-evolution could also take place if a member was enacting a pre-assigned role, but tended to be to a lesser extent than role floating, role re-assignment and role exploration.

The above steps were taken on a within-case level and helped us to identify unique case patterns. Thereafter, we conducted a cross-case analysis where we moved back to the higher-level CAS variables of the environment (nature of an adverse event, internal and external facilitators and inhibitors), internal mechanisms (member roles as part of network schema) as well as co-evolution (exploitation of facilitators, re-acting to inhibitors, role enactment, role re-assignment and role exploration). The cross-case analysis also allowed us to identify underlying patterns that provide insights on co-evolution between the SN and the environment where we, e.g., found that the familiarity with the initial environmental conditions immediately after an adverse event struck determined what schema would be used and how, if needed, they would be adapted. Furthermore, we looked at the four events longitudinally to be able to observe spill-over effects between events and emerging schema over time. An overview of the coding scheme is provided in Appendix IV.

Overall, the qualitative data analysis in Study II was aimed at deriving insights toward theoretical concepts via analytical generalisability (Ridder, 2017), rather than statistical generalisability. Having said that, we did use the qualitative study to triangulate the results of the quantitative study and vice versa. The purposeful selection of cases based on theoretical replication, seeking feedback from respondents, a case study data base and having two author(s) analyse the data helped us, amongst others, to further safeguard the trustworthiness of the qualitative data collection and analysis (Lincoln, Lynham, and Guba, 1994; Yin, 2009).

3.4 Results – Quantitative Study

General Set-up

Stepwise regressions were performed to explore the significance and relative influence of different (groups of) variables on resilience (Table 2). The more dramatic the change in coefficients already included in a previous model when a new (set of) variable(s) is added, the more influential the newly added (group of) variable(s) is. Once all 26 variables had been regressed (Table 2, Model 9), the six insignificant ones were dropped from the analysis (Table 2, Model 10) in order to achieve greater accuracy in estimating the coefficients of the statistically significant variables. The bivariate correlations and descriptive statistics of the variables are shown in Appendices V and VI respectively. We now report the results of the network level (Table 2, Model 10) and node level (Table 3) performance effects (delivery delay).

Table 2: Regression results

Categories		DV: DELIVERY DELAY (IN DAYS)									
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Performance Effects	Constant	8.63***	7.84***	4.49***	16.82***	18.49***	16.02***	0.30	-9.80***	-8.54***	-6.83***
	Earthquake response	2.87***	2.28***	3.35***	6.19***	5.99***	5.51***	-0.89***	-0.67***	-0.47*	-0.42†
	Cholera-C response	-3.26***	-4.63***	-4.86***	-0.69***	-0.86†	-0.58***	-4.24***	-3.67***	-3.52***	-3.49***
Node level (end-customer) ‡	Floods response	1.03	0.49	0.63	-8.22	-7.93***	-8.78	0.77	1.10*	1.20*	1.09**
	Cholera-H response	-1.92**	2.55**	1.21	3.34**	3.11***	4.25***	1.88***	2.09***	2.10***	2.19***
	Haiti	5.67***	5.39***	18.36***	18.15***	18.15***	19.17***	14.52***	13.53***	13.84***	13.96***
Time period	Chad	-10.16***	-10.19***	-5.85***	-5.85***	-5.92***	-5.34***	-3.13***	-4.56***	-4.05***	-3.55***
	Pakistan	43.31***	47.63***	53.19***	53.16***	50.44**	50.44**	16.00***	17.25***	17.31***	17.31***
	Period (quarterly)	0.88***	0.88***	0.58***	0.52***	0.52***	0.53***	-0.18***	-0.35***	-0.27***	-0.26***
Proximity	Virtual	-6.78***	-6.76***	-6.89***	-6.89***	-6.89***	-6.89***	-4.26***	-3.95***	-4.11*	-4.18***
	Spatial	0.94**	0.90**	0.94**	0.90**	0.90**	0.94**	0.20***	0.28***	0.27***	0.28***
	Product type	-0.27***	-0.27***	-0.23***	-0.23***	-0.23***	-0.23***	-0.05	-0.05	-0.05	-0.05
Product characteristics	Drugs	0.20	0.20	0.20	0.20	0.20	0.20	0.16	0.16	0.13	0.13
	Special requirements	0.28	0.28	0.15	0.15	0.15	0.15	0.71*	0.63†	0.55	0.55
	No. of items per order	0.03***	0.03***	0.03***	0.03***	0.03***	0.03***	0.04***	0.04***	0.04***	0.04***
Order-related aspects	No. of vendors per order	-0.20***	-0.20***	-0.20***	-0.20***	-0.20***	-0.20***	-0.60***	-0.62***	-0.61***	-0.60***
	Price per order line	0.00*	0.00*	0.00*	0.00*	0.00*	0.00*	0.00***	0.00***	0.00***	0.001***
	Volume of shipment	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	0.00	0.00***	0.00	0.00
Upstream members	Air transport mode	1.36	1.36	1.36	1.36	1.36	1.36	5.88***	5.84***	6.08***	6.19***
	Supplier ranking	-0.76***	-0.76***	-0.76***	-0.76***	-0.76***	-0.76***	-0.76***	-0.76***	-0.76***	-0.82***
	3PL provider	0.66***	0.66***	0.66***	0.66***	0.66***	0.66***	0.65***	0.64***	0.64***	0.64***
Operational Context	Response setting	0.53*	0.53*	0.53*	0.53*	0.53*	0.53*	0.70**	0.70**	0.53*	0.49*
	State fragility	0.44***	0.44***	0.44***	0.44***	0.44***	0.44***	0.44***	0.44***	0.35***	0.28***
	End-customer ranking	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.26	0.26
Downstream	Starts & ends in 5-year period§	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	Running 3+ yrs in 5-year period§	1.01***	1.01***	1.01***	1.01***	1.01***	1.01***	1.01***	1.01***	1.01***	1.05***
	No. of observations	27742	27742	27742	27742	27742	27742	27742	27742	27742	27742
Other (control) variables	No. of sub-samples	50	50	50	52	103	318	497	973	1522	398
	Scale estimate	16.36	15.14	14.61	13.57	13.54	13.56	11.95	11.85	11.85	11.92
	Robust R2 (w)	0.03	0.42	0.47	0.61	0.61	0.61	0.71	0.71	0.71	0.71
	Robust R2 (rho)	0.01	0.06	0.06	0.13	0.13	0.13	0.28	0.28	0.28	0.28
		0.01	0.06	0.06	0.13	0.13	0.13	0.28	0.28	0.28	0.28

Coefficient significant at the 0.065*, 0.05**, 0.01***, 0.001**** level,
 ‡ Captures overall performance differences at affected node levels over the entire data period; t-tests were later conducted to test for differences in mean during a response to an adverse event and otherwise,
 § Relates to the duration of on-going operations downstream

Within-Case Analysis: Network versus Node Level Effects

Earthquake Case

The SN had a net improvement in performance during the earthquake response as shown by the negative β value ($\beta=-0.42$, $p<0.065$). On the contrary, at the node level (Haiti), the mean delivery performance during the response was worse than before and after the response.

Cholera-C Case

The SN had a net improvement in performance during the cholera response ($\beta=-3.49$, $p<0.001$). Furthermore, at the node level (Chad) the performance during the response was also significantly better than before and after. Therefore, both the node and network realised their best performance during the response phase of the cholera outbreak.

Floods Case

The network experienced a decline in delivery performance during the flood response ($\beta=1.09$, $p<0.01$). However, at the node level (Pakistan), the mean delivery performance improved substantially during the response dropping from a mean delay of about 46 days before and after the response to a mere 4.3 days.

Cholera-H Case

There was a decline in delivery performance during the cholera response at both the network level ($\beta=2.19$, $p<0.001$) and the node level (Haiti).

Cross-case Analysis

Overall, the quantitative results show that at the SN level, adverse events had a less severe disruptive impact – with the network even benefiting in some instances – compared to the node level (places of adverse event occurrence). Looking across the four cases, the node-level findings are consistent: the unforeseeable adverse events (Earthquake Case and Cholera-H Case) were disruptive, whereas performance improved following the foreseeable adverse events (Cholera-C Case and Floods Case). At the network level, however, the influence of foreseeability is less clear. Network performance improved during the response to Earthquake Case, but worsened during the response to Cholera-H Case; it improved for the response to the foreseeable Cholera-C Case, but worsened during the response to the Floods Case. We sought explanations for these findings in the qualitative study.

Table 3: T-test results and descriptive statistics for performance outcomes (node level)

T-test results for performance outcomes for each event during vs. before and after								
Case	During response to event			Before and after response to event			d.f.	t
	M	SD	N	M	SD	N		
Earthquake	15.42	18.33	116	12.45	17.36	1412	132.81	-1.68*
Cholera-C	-15.47	18.55	649	7.34	17.73	1399	1214.24	26.26**
Floods	4.33	51.50	648	45.99	28.55	1653	808.21	19.45**
Cholera-H	21.27	18.27	483	8.71	15.53	1045	817.27	-13.08**

Significance levels:

* $p < 0.05$ ** $p < 0.001$

Other Effects

In line with existing research, Table 2 further shows that proximity (model 3 versus model 4) and upstream network members (model 6 versus model 7) are highly influential. On average, end-customers with close virtual proximity to the affected end-customers (i.e., in the same processing portfolio as the affected end-customers) benefited the most in relation to delivery performance ($\beta = -4.18$, $p < 0.001$). On the contrary, spatially proximate ones (i.e., in similar geographic regions as the affected end-customer) were negatively affected ($\beta = 0.28$, $p < 0.001$). Also, suppliers were instrumental in averting delivery delays, thereby reducing disruption impact overall ($\beta = -0.82$, $p < 0.001$) while the opposite applied for the 3PL provider ($\beta = 0.64$, $p < 0.001$). The 3PL provider was the sole member responsible for the consolidation of virtually all orders from suppliers to the end-customers. Given the demand surges of 2010 (Appendix I), it was stated during the interviews with members of the interface organisation (Study II) that this result was deemed inevitable and not considered to imply that the 3PL provider failed to meet expectations.

The main effects of the operational context, i.e., response setting, of the end-customer before the adverse event ($\beta = 0.49$, $p < 0.05$), state fragility ($\beta = 0.28$, $p < 0.001$), and operations on-going for 3+ years ($\beta = 1.05$, $p < 0.001$) were also significant. In accordance with intuition, since most response settings were in active conflict and/or unstable, the operational context downstream was found to have a major negative impact on performance. It was, therefore, worthwhile to include these control variables in our model as it enhanced the reliability of our findings.

3.5 Results – Qualitative Study

Within-case Analysis: Insights from Each Adverse Event

Earthquake Case

A myriad of inhibitors faced at the node level (Haiti) rendered the network's adaptive responses insufficient to avert disruptions in Haiti. However, these responses, in combination with internal and external facilitators, benefited the rest of the network: at the network level, goods generally arrived earlier than the requested delivery dates.

The network did not prepare specific schema for a response to this earthquake because by nature, timing and place of occurrence could not be predicted precisely. However, the network's upstream members always prepared for such events in general because downstream members tend to be incapacitated after such events. Downstream members were expected to assume the crucial role of information sharing in the early stages of the response. To facilitate responsiveness, key upstream members' roles were mostly clarified and assigned through contracts and the level of guaranteed additional capacity to deal with demand surges was agreed upon based on past experience. The network members also anticipated that initial conditions at the place of occurrence are extremely difficult to predict after such events. Thus, some roles were floated pending event onset. Typically, role floating applied to transportation and supply to meet unforeseen needs. Despite these measures, internal inhibitors at the onset of the earthquake led to limited network functionality in the response phase. Notably, the member holding the bulk of the network's emergency stocks was transitioning through a major system upgrade (Supplier 1) and manufacturers in China, who typically scale up production quickly, had shut down for the Chinese New Year. These inhibitors had a negative effect on performance, especially in Haiti.

After the earthquake struck, performance in Haiti worsened during the response phase because external inhibitors outweighed the members' response efforts. Severe damage to buildings led to the loss of supplies that were already in-country and unprecedented humanitarian needs. This was exacerbated by the destruction of communication and transport infrastructure within Haiti. Because of these inhibitors, the end-customer was restricted to sharing information whenever possible and it could not reliably identify humanitarian needs or make decisions and requests concerning supply. Some ongoing activities were temporarily suspended, while delivery for those that remained was postponed indefinitely because of challenges with getting supplies into Haiti. The

upstream members tried to adapt and counter these issues. They quickly secured alternative supply sources (Supplier 2 was instrumental in this) and establishing alternative transport routes. These routes had long transit times and were not as efficient as required, but still yielded better results than trying to bring in supplies through an already clogged airport. The role of transporting goods into Haiti was initially assigned to the 3PL provider but was reassigned to the interface organisation, because they received reliable local information faster through their network of local contacts. The interface organisation also exploited external facilitators. In particular, they proactively communicated with potential donors and, when the host government temporarily relaxed customs regulations, they sent supplies that would be needed in the later stages of the response phase and for long-term operations within the country.

Performance improved at the network level mainly because external inhibitors slowing down the flow of supplies into Haiti forced the upstream members to redirect the momentum that they had built to fulfil demand in Haiti to other parts of the network. In addition, although significant man-hours and other resources were diverted to the earthquake response, the network also tried to ensure that the disruptive event would not cascade further in the network, and that the rest of the end-customers would receive their orders within the agreed timelines. They did so by isolating processes related to the earthquake response as much as possible. Internal inhibitors, like the network's limited functionality and physical space constraints faced by the 3PL provider, meant that this isolation was not always possible. An additional facilitator that benefited the overall SN was Supplier 2's role in securing alternative sources of supply. Ultimately, the performance improvement at the network level was marginally significant (Table 2).

Cholera-C Case

The network's adaptive responses to the event enabled it to avert disruptions at the node level (Chad) and within the overall network. Supplies for ongoing operations generally arrived earlier than requested during the response phase.

The network's preparedness schema used for cholera outbreaks were developed by the end-customer because they were foreseeable, with a warning period of at least two months. The roles of upstream and downstream members were defined, clarified, and assigned in anticipation of an outbreak. The end-customer was solely responsible for

preparedness activities such as building emergency stocks and making storage location decisions once an outbreak became imminent. The upstream suppliers would only keep a small amount of emergency stocks for an outbreak and generally get involved at a later stage in the response phase of a specific outbreak. Most preparedness stocks were held by Supplier 1, but levels were determined by the interface organisation; Supplier 2 kept stocks out of its own initiative and based on past experience. When an outbreak occurred, the upstream members' main role was replenishing supplies at the end-customer's request.

Once the cholera outbreak occurred in Chad, performance improved in Chad mainly because the end-customer had high preparedness capabilities due to experience. Friendly regulatory conditions further facilitated uninterrupted operations. As a result, the end-customer was able to swiftly order emergency preparedness supplies when the outbreak became imminent while considering possible performance inhibitors for ongoing operations: an ongoing vaccination campaign, a flood response operation, as well as the cholera outbreak itself. The end-customer's approach was successful: by enacting its assigned role of decision-making regarding balancing priorities in such situations, the level of involvement of upstream members was minimised. Upstream members mostly maintained their pre-assigned roles, but took advantage of the more frequent deliveries into Chad by expediting orders for other ongoing operations. This contributed to improved performance at the node level.

Performance at the network level improved during the response phase mainly because the upstream network members had sufficient time to respond to the needs arising in Chad and their role was ultimately limited to replenishing supplies as and when needed. Therefore, the cholera outbreak did not interfere with ongoing operations; the limited need for support from the upstream network members occasionally created additional capacity to serve other end-customers. The upstream members (mainly the interface organisation and Supplier 2) also secured alternative sources of supply to meet needs in the ongoing response to the Earthquake Case, relieving pressure on Supplier 1. These approaches further contributed to better than usual performance at the network level.

Floods Case

The network's adaptive responses were insufficient to avoid disruptions at the network level. At the node level (Pakistan), however, the successful exploitation of facilitators led to improvements in delivery performance (Table 3).

The network's preparedness schema for floods dictated that most activities were conducted by the end-customer. The end-customer prepared for the floods and also coordinated the network's response once the floods became imminent. In Pakistan, a major external inhibitor was the existence of strict regulations for bringing in relief supplies from abroad. This made it difficult to build emergency stocks in-country on short notice leading to adaptation of the general schema for floods: emergency stocks had to be held outside the country in anticipation. The end-customer was the most capable in quickly establishing what was needed to ensure acceptance of relief items in the event that regulations remained unchanged or partially relaxed. This, in addition to the network's overall experience with flood response operations, were the main reasons the end-customer had the coordination role in the response phase.

Performance at the node level (Pakistan) improved mainly because a state of emergency was declared at the floods' onset. This was an important facilitator for averting delivery delays, as it led to the temporary relaxation of customs regulations which, in turn, created an opportunity to bring in supplies for on-going and emergency response operations significantly faster than usual. Another facilitator was the network's experience with such incidents. The end-customer quickly requested essential supplies needed in the country and shared information about the documentation needed to expedite the customs clearance process. The upstream members accelerated the processing and shipping of pending orders and the interface organisation secured a donation for essential items that had never been used by any of its end-customers. These collective response efforts reduced lead times for Pakistan-bound supplies.

Performance at the network level suffered mainly because, at this point, some key members were developing fatigue. They struggled to cope with the needs arising from the multiple adverse events over the year. This became a major inhibitor for the overall functioning of the network. Bringing supplies into Pakistan led to partial diversion of attention from other end-customers, especially those in the same processing portfolio

as Pakistan. The extent of this diversion was worsened by the unprecedented magnitude of the flood which left about 20 million people in need of assistance and the proactive attempts to send as much supplies as needed to Pakistan within the state of emergency period.

Cholera-H Case

The network's adaptive responses were dwarfed by the inhibitors experienced both downstream at the node level (Haiti) and upstream within the SN. As a result, there were disruptions at the node level and network level alike.

The network typically prepared for cholera outbreaks downstream because of their foreseeability. However, the Haiti cholera outbreak was completely unforeseen because the country had no history of the disease. Thus, there were no preparedness schema for an outbreak in Haiti itself, let alone at the network level. Moreover, the respective roles of different SN members through the disruption phases were not pre-assigned. Two facilitators that mitigated the disruption impact were that the network had general schema for dealing with cholera outbreaks and that the end-customer had restored full functionality following the earthquake in January. Once the cholera was confirmed, the end-customer made decisions regarding the scale and scope of their intervention and promptly communicated their plans with upstream members. Meanwhile, the upstream members knew where to source from the requires supplies from and how best to transport it into Haiti.

Performance at the node level (Haiti) suffered mainly because of the late identification of cholera and renewed competition for limited resources under time pressure (see Earthquake Case). Furthermore, despite the host government's declaration of a state of emergency, some restrictive customs regulations remained in force leading to supplies being held up at customs for extended periods. Upstream, the demand surge caused by this outbreak led to major space constraints for the 3PL provider, compelling them to find an additional facility from which to serve Haiti. Time was also lost in role exploration, whereby efforts were made to liaise with other SNs to set up a central warehouse in Haiti and share storage space, shipping capacity from Europe, and all related costs. These efforts proved futile because of misaligned goals and schema among the involved networks. On the upside, though, the upstream members of the network under study were able to partially counteract these effects by using their

previously acquired knowledge of routing limitations and alternatives in(to) Haiti from the previous response (Earthquake Case). Their running supply-line for the response to the Cholera-C Case in Chad also facilitated better responsiveness.

Performance at the network level suffered because of circumstances beyond the control of some critical network members as well as self-imposed limitations. Some members were fatigued and could barely cope. Others were unwilling to make any costly additional changes that could lead to idle capacity in the long run, because they perceived the year 2010 to be unprecedented in terms of the number, magnitude, and impact of adverse events. At this point, SN members focused mostly on ensuring continuity of operations and keeping negative performance implications of the adverse events on ongoing operations at an acceptable level.

Cross-case Analysis

Table 4 summarises the findings from the within-case analysis (qualitative and quantitative study). It depicts the nature of an event and for both, node and network level, inhibitors and facilitators, SN schema for the preparedness and response as well as disruption impact measured in terms of delivery delay. We now analyse these aspects across the four cases.

Nature of an Adverse Event and Additional Inhibitors and Facilitators

At the node level, the qualitative analysis provides further support for the finding in the quantitative study that disruption impact at the node level is negatively related to the predictability of an adverse event. End-customer experience with adverse events was an internal facilitator for averting disruptions in relatively predictable events. Arising opportunities, when exploited, further facilitated averting otherwise bleak outcomes. These external facilitators sometimes led to performance outcomes that were substantially better than normally achieved. This was most clearly demonstrated in the Floods Case where the relaxation of regulations led to a drop in average delivery delay from about 46 days to a mere 4 days at the node level (Pakistan) (Table 3).

Table 4: Summary of findings from within-case analysis and quantitative study

		Adverse event			
		Earthquake Case	Cholera-C Case	Floods Case	Cholera-H Case
Event nature: Predictability: Magnitude		Low, High	High, Low	High, High	Low, High
Response period, 2010 →		January – September	August – November	September - December	October - December
Facilitators/ Inhibitors (examples) External facilitators (E ⁺) or inhibitors (E ⁻) and Internal facilitators (I ⁺) or inhibitors (I ⁻)		(E ⁻ ; I ⁻) Severe damage to infrastructure, unprecedented demand; loss of supplies (E ⁻) Relaxation of restrictive regulations; multiple donors	(E ⁺) Friendly regulatory conditions (I ⁻) Ongoing vaccination campaign and response to floods in addition to regular ongoing operations	(E ⁻) Severe flooding; unprecedented demand (E ⁺) Temporary relaxation of highly restrictive regulations; multiple donors	(E ⁻) Unprecedented demand; challenges from earthquake aftermath; some restrictive regulations back in force (I ⁺) Pre-established transport routes in(to) Haiti
Preparedness Schema (Upstream and downstream SN member roles)		No roles assigned i.e. no activities for this particular event	All activities assigned to the end-customer including making facility location decisions once the outbreak became imminent.	All activities assigned to the end-customer (including building emergency stocks once the floods became imminent	No roles assigned i.e. no activities for this particular event
Response Schema (Upstream and downstream SN member roles; inherent co-evolution)		<ul style="list-style-type: none"> End-customer shared information in the early stages (role exploration) Interface organisation pushed supplies into Haiti (role exploration) Interface organisation took over transportation role from 3PL (role re-assignment) 	<ul style="list-style-type: none"> End-customer and upstream members enacted their pre-assigned roles Upstream members exploited external facilitator to ship goods frequently to Chad 	<ul style="list-style-type: none"> End-customer enacted its pre-assigned role Interface organisation enacted its pre-assigned role Interface organisation leveraged external facilitator related to relaxed regulations 	<ul style="list-style-type: none"> End-customer made all crucial decisions (role exploration) Interface organisation leveraged internal facilitator on knowledge of routing options Interface organisation made an unsuccessful attempt to collaborate with other SNs (role exploration)
Performance outcomes (Disruptive impact: Delivery delay)		Negative in Haiti; worse than for other end-customers	Positive in Chad; comparable to other end-customers	Negative in Pakistan-albeit much better than usual; better than for other end-customers	Negative in Haiti; also negative for other end-customers
Node level (Place of event occurrence)					

		Adverse event			
		Earthquake Case	Cholera-C Case	Floods Case	Cholera-H Case
Facilitators/ Inhibitors (examples) External facilitators (E ⁺) or inhibitors (E ⁻) and Internal facilitators (I ⁺) or inhibitors (I ⁻)		<p>(E⁺; I⁻) Chinese New Year holidays; key manuf. unavailable</p> <p>(F⁻) Limited network functionality (key supplier working at limited capacity due to system upgrade)</p> <ul style="list-style-type: none"> All preparedness activities assigned to upstream members Key members' roles specified in, e.g., contracts Other roles floated e.g., additional capacities for supplies 	<p>(I⁻) On-going large-scale response in Haiti</p> <p>(F⁻) Limited emergency supplies for events like this</p> <p>No roles assigned i.e. no preparedness activities beyond holding limited emergency supplies for events like this</p>	<p>(E⁻) Mounting demand and number of major adverse events</p> <p>(F⁻) Increasing members' fatigue due to prolonged responses to multiple events</p> <p>No roles assigned i.e. no preparedness activities assigned to members beyond holding limited emergency supplies for events like this</p>	<p>(E⁻) Overall unprecedented demand and number of major adverse events</p> <p>(F⁻) Some members were fatigued due to prolonged responses to multiple events</p> <p>All preparedness activities assigned to upstream members; because the event was unforeseeable in Haiti there was never preparation for an outbreak of this scale.</p>
Preparedness Schema (Upstream and downstream SN member roles)		<ul style="list-style-type: none"> Network enacted assigned roles Role re-assignment upstream to adapt to internal and external inhibitors Interface organisation and 3PL provider made efforts to isolate Haiti-related needs and processes from the rest of the end-customers 	<ul style="list-style-type: none"> Upstream network members supported the end-customer once an outbreak became imminent (role enactment) Seeking alternative sources of supply for current needs and anticipated future demand (role re-assignment) Separation of processes for different end-customers 	<ul style="list-style-type: none"> Interface organisation worked in liaison with end-customer and other upstream members once floods became imminent (role enactment) Role exploration in efforts to keep up with demand in the presence of mounting network-wide fatigue Temporary diversion of resources to focus on needs and opportunities in Pakistan 	<ul style="list-style-type: none"> Network enacted assigned roles Roles were re-assigned and others still explored with members of other networks Focus on maintaining continuity of operations in midst of fatigue and unprecedented demand by most upstream network members.
Response Schema (Upstream and downstream SN member roles; inherent co-evolution)		<ul style="list-style-type: none"> Positive for the overall network, albeit marginal 	<ul style="list-style-type: none"> Positive for the overall network 	<ul style="list-style-type: none"> Negative for the overall network 	<ul style="list-style-type: none"> Negative for the overall network
Performance outcomes (Disruptive Impact: Delivery delay)					

Table 4 ctd.

At the network level, outcomes were not as straightforward. Network level performance was not always negatively associated with event predictability. Specifically, it improved for the Earthquake Case but worsened in the Cholera-H Case. Generally, though, the network tended to benefit more from the onset of adverse events than the affected nodes. External facilitators, such as donations, benefited the affected node directly and the network indirectly through, for example, enhancing resource availability within the network. Internally, inhibitors at the affected node became facilitators for shorter lead times for the rest of the network as resources were diverted to the rest of the network pending solutions to these local inhibitors. The exception to this was when the network was responding to more than two adverse events at the same time. In these situations, the cumulative effect of inhibitors outweighed facilitators.

Member Roles (Schemata) and Co-evolution

The nature of an event and the additional facilitators and inhibitors in and of themselves could not sufficiently explain realised performance outcomes, especially at the network level. How network members interacted and co-evolved internally, but also with the interpreted and enacted environment was equally important. Particularly in cases with opposing disruption effects at the node versus network level (Earthquake Case and Floods Case), member interactions largely accounted for the deflected disruption trajectories from the node level to the network level. The SN, regardless of event predictability, defined, clarified and assigned member roles upfront as much as possible. Upstream, key members like the 3PL provider and Supplier 1 actively communicated about the maximum guaranteed capacity in instances of demand surges. The difficulty of anticipating the initial conditions at the onset of an adverse event required co-evolution and influenced how roles were subsequently enacted or evolved in the response phase. In particular, roles were sometimes reassigned or, when unforeseen, the network explored assignment options.

In terms of the nature of an event, the network had a basic schema for responding to adverse events based on their predictability and regardless of potential magnitude; it was poised to co-evolve by exploiting facilitators and dealing with inhibitors after an event's onset. Preparedness for relatively predictable events was pushed down to the end-customer, who was also expected to take the lead in decision-making once the event became imminent and throughout the response phase. This way, the end-

customer could leverage their experience in dealing with those events and be responsive to downstream inhibitors and exploit facilitators, thereby shielding the network from spill-over effects that could inhibit overall network functioning. The network facilitated good performance by primarily taking advantage of more regular shipments to the affected nodes. As a result, not only were disruptions completely averted at the affected nodes, but these nodes achieved better performance than usual in the response phase. On the contrary, preparedness for low-predictability events was pushed upstream. The interface organisation made pre-arrangements with selected network members, while ready to explore other options, i.e., co-evolve with the environment, if these pre-arrangements would be insufficient to cater to demand. Supplier 2 independently complemented this role. Despite the preparedness of the upstream members and some major facilitators, the unpredictability of the adverse events, the inexperience of the end-customers, and inhibitors like clogged transport systems inevitably led to disruptions at the affected nodes.

The extent of the network members' co-evolution with the environment was dependent on their familiarity with the situation. Some situations were similar to those in the past and network members would enact their past or pre-allocated roles. Naturally, this limited the extent of adaptation (e.g., in the Cholera-H Case, the interface organisation was in charge of the transport into and within Haiti as they had done in the Earthquake Case). However, if the network faced unique situations (or the same situations leading to unfamiliar circumstances), the members had to adapt their response schema to fit the new demands. This generally implied co-evolution via immediate (re-)assignment of roles to members who were most suited under the circumstances or role exploration whereby the network would need to figure out what to do and/ or then identify who would take on that role. For example, in the Cholera-H Case, the unprecedented scale of the cholera outbreak compelled the network to explore collaboration opportunities with other networks. How SN members adapted and co-evolved with unique situations determined the extent to which they were able to mitigate the disruption impact at the place of occurrence and fend off knock-on effects within the network.

In addition, members had to respond to internal facilitators and inhibitors in efforts to mitigate disruption impact at the node and network levels; both influenced, and were influenced by, member actions. For example, the decision to re-assign roles in

the Earthquake Case was influenced by the status of critical suppliers at the onset of the earthquake: Supplier 1 undergoing an IT upgrade and suppliers of made-to-order items in China being on holiday. This action facilitated the network's responsiveness to the additional needs. Furthermore, as the adverse events piled up and needs skyrocketed, some members placed self-imposed thresholds on capacity, which inhibited the network's performance overall. These members were of the opinion that they had reached the peak of the unprecedented needs and deemed some disruptive impact as acceptable at this point. This proved correct as, already in 2011, the network experienced significantly lower demand (Appendix I).

At the network level, network members converted node-level inhibitors at the affected places into facilitators for the rest of the network. In particular, because of inevitable shipping delays to affected nodes caused by external inhibitors (Earthquake Case and Cholera-C Case), the interface organisation orchestrated the diversion of resources or momentum built for responding to the adverse events to other end-customers. The goal was to avoid having idle capacity and holding up resources while trying to overcome inhibitors at the affected nodes.

At the onset of the third and fourth adverse events, the build-up of fatigue within the network due to responding to multiple adverse events, a lack of preparedness for multiple adverse events, and the self-imposed capacity thresholds became major internal inhibitors. The network's ability to shield other end-customers from the demand spikes resulting from these events was compromised. The network could not adequately cope with demand and the perceived urgency of the needs at the affected nodes led to diversion of (more) resources from the rest of the network to those nodes.

3.6 Discussion and Conclusions

Drawing on CAS theory, this research set out to study how SNs achieve resilience. Recent research (e.g., Zhao et al., 2019) applied the same theory and focused on structural elements of SN resilience by modelling SNs as an agent-based system. We are able to complement and extend previous findings based on longitudinal quantitative and qualitative data that provides insights into the emergent behaviour of SNs in preparations and response to adverse events. We next discuss implications for theory and practice from our results on the relationship between the nature (predictability and magnitude) of an adverse event and its disruptive impact at the

place of occurrence (node level) as well as at the network level, and on how network members interact and create/ adapt schema during preparation/ response to adverse events and co-evolve with the environment.

Implications for Theory

Considerations of the Environment in Building Network Resilience

A key component of CAS relates to changes in the enacted and interpreted environment (Nair and Reed-Tsochas, 2019), such as adverse events whose effects SN members have to be resilient to. The extant literature on risk management suggests that organisations should assess the risk associated with adverse events on the basis of their predictability and magnitude of impact (e.g., Knemeyer et al., 2009). Such an assessment then allows determination of the most suitable preparedness and response schema for a given combination of predictability and magnitude scores. Predictability and magnitude of impact are often assumed to have the same influence on disruption impact, i.e., are weighted equally (Norrman and Jansson, 2004). Yet, earlier research found that while both are significant, the perceived probability of supply disruptions has more than twice the effect on perceived disruption risk than the perceived magnitude (Ellis et al., 2010). Our findings support this notion, i.e., that predictability is more influential than magnitude, yet based on actual effects rather than perceptions. At the same time, we also used a more fine-grained perspective on magnitude of an event than previous studies have: we separate the magnitude of an event from its disruptive impact. In doing so we separately consider the magnitude of impact at the place of occurrence and the actual performance outcomes at the network and individual node level.

Our results for node-level outcomes show that the unforeseeable events led to disruptions whereas the foreseeable ones did not. This is not surprising given that repeated exposure to specific events makes network members more capable of responding to disruptions or even averting them over time (Tukamuhabwa et al., 2015). Furthermore, we found this only to be true if the SN is dealing with a manageable number of adverse events. If, however, a foreseeable event is of very high magnitude (Floods Case) and multiple adverse events happen at the same time, then the relationship between predictability and magnitude is altered. The longitudinal nature of the data allowed us to understand that as the adverse events piled on and/ or the response operations were prolonged, magnitude became as influential as

predictability for disruption impact. Thus, we provide a more nuanced and objective picture of the relationship between predictability and magnitude of adverse events stemming from the environment that needs to be considered when developing preparation and response schema at the SN level.

Proposition 1a In a SN dealing with a single adverse event, foreseeability of the event has more influence on disruption impact than its magnitude.

Proposition 1b In a SN dealing with multiple adverse events, the onset of an additional foreseeable adverse event can be just as disruptive as an unforeseeable one.

Considerations of Internal Mechanisms in Building Network Resilience

In response to adverse events, a SN needs to adapt its structures and behaviour to ensure continuity of operations (Zhao et al., 2019). Several findings on structural aspects such as network density, complexity or node criticality and their relationship to disruption impact, likelihood and/ or frequency, and the use of adaptive (structural) strategies have been provided in the literature (Bode and Wagner, 2015; Craighead et al., 2007; Kim et al., 2015; Zhao et al., 2019). Similarly, research on emergent behaviour and network resilience provides insights on risk perceptions (Ellis et al., 2010; Vanpoucke and Ellis, 2019) or personality traits (Timmer and Kaufmann, 2019). Most of these studies neglect a true network view – they capture what each member can do individually to maintain performance, but not what role network-wide schema (can) play in building *network* resilience (Zhao et al., 2019; Tukamuhabwa et al., 2015). This is, however, crucial given self-organising efforts of SN members without any centralised control (Surana et al., 2005).

Recently, Martins de Sa et al. (2019) were the first authors to make a distinction between upstream and downstream actions in the context of SN resilience. They find that for unforeseeable events SN resilience depends on the capacity of downstream organisations. Additionally, findings from Zhao et al. (2019) show that proactive schema are superior to reactive network schema when it comes to building or enhancing resilience. Our results support and extend the insights of both studies by considering the predictability of an event while simultaneously distinguishing between preparedness and response schema. We find that having preparedness activities for unforeseeable events upstream enable quick adaptation to changes that require network-wide efforts and better prediction of aggregate demand, even if it cannot be

determined in advance where or when the events will occur. This result is in line with well-known insights on postponement strategies, which stipulate that the more unforeseeable events causing surges in demand are, the further upstream decisions should be taken (e.g., Pettit et al., 2013; Tang, 2006). At the same time, and in line with Martins de Sa et al. (2019), we find that in response to an unforeseeable event, downstream network members should be in control of decision making. Our results further show that if events have relatively high predictability, during preparation the decision-making power should be as far downstream as possible, while the rest of the network should be ready to get involved once it strikes in order to facilitate network resilience.

Proposition 2a To enhance SN resilience to foreseeable adverse events, preparedness activities should take place downstream in the network and the rest of the SN should be poised to assist as and when needed once the event become imminent or takes place.

Proposition 2b To enhance SN resilience to unforeseeable adverse events, preparedness activities should take place upstream in the SN and affected network members should be poised to provide essential information and take over the decision-making role at or shortly after an event's onset.

Furthermore, and in line with previous literature (e.g., Scholten et al., 2014), we also find that assigning specific roles to different members within a network is a crucial facilitator for SN resilience. These roles can be thought of as collective SN's schema for responding to adverse events facilitating emergent network behaviour (e.g., Choi et al., 2001). While interactions that entail actions like collaboration, distributing authority, and good communication have been emphasised (Jüttner and Maklan, 2011; Pettit et al., 2013), the resilience literature is silent regarding individual member roles. Our findings highlight that responsiveness can be facilitated by defining and assigning specific member roles as much as possible in preparedness schema. In familiar situations- usually more foreseeable events, such preparedness schema put the SN in a good position to respond (Tukamuhabwa et al., 2015). To be able to also deal with unfamiliar or unprecedented situations that require rapid adaptation, preparedness schema need to include floating some roles, i.e., putting off the allocation of roles until the event has taken place, in preparation for adverse events while having the flexibility

for role (re-)assignment and role exploration in the response phase. We have found these to enable rapid co-evolution.

Proposition 3a Regarding familiar situations faced by the SN at the onset of adverse events, having members' roles clarified and assigned as fully as possible in the preparedness phase enhances SN resilience.

Proposition 3b Regarding unfamiliar situations faced by the SN at the onset of adverse events, floating certain roles in the preparedness phase while having flexibility to (re-)assign and explore certain roles in the response phase enhances SN resilience.

Resilience and Co-evolution

In CAS, network members jointly attempt to fulfil customer demand through individual actions while making adaptations to accommodate changes from the environment and the actions of other network members (Pathak et al., 2007). Therefore, their actions should not be viewed in isolation due to co-evolution and varying outcomes at the node and network levels (e.g., Wycisk et al., 2008). In line with Kim et al. (2015), we find that node-level disruptions do not necessarily culminate in network level disruptions. Particularly in the Earthquake Case, the power of co-evolution is demonstrated. The network faced major inhibitors, both internally and externally, at the onset of the earthquake. However, the network's schema for responding to such adverse events were instrumental in deflecting the disruption impact from the node level and turning it into a positive outcome for the overall network. A combination of quick adaptation to inhibitors and maximising the benefits of facilitators by leveraging them beyond the immediate needs enabled the network to achieve this dramatic difference between the node and network level outcomes. The network member exhibited a high level of co-evolution in their interactions which enabled them to change the network-level fortunes performance-wise. Therefore, while we find an inevitable decline in performance brought on by *unforeseeable* adverse events as theorised in the resilience literature (e.g., Blackhurst et al., 2011), this is only consistently observed at the node level where the event occurs.

Proposition 4 Regarding unforeseeable adverse events, a network members' ability to members to quickly co-evolve with initial and emerging conditions after an adverse event's onset enables the prevention of node-level disruptions from

cascading to the network level and even creates performance enhancement opportunities for the overall SN.

Simultaneously, we found that the cumulative effect of different adverse events over time influenced the way the network co-evolved with the environment, i.e., multiple adverse events became a major inhibitor (see also Proposition 1b). Network members either became fatigued and unable to cope or consciously made decisions to maintain continuity while accepting a temporary decline in performance. Therefore, our study demonstrates and confirms previously highlighted requirements that resilience needs to be cultivated and maintained over time (Seville et al., 2015; Tukamuhabwa et al., 2015) while also showing how a decline in performance at the network level can be inevitable.

Proposition 5 The cumulative effects of adverse events in a SN over time can hamper a SN's ability to sufficiently co-evolve with its environment leading to inevitable disruptive impact across the network.

Implications for Practice

Based on the insights from this research, we offer four main recommendations for managing SNs with respect to preparing for, and responding to, the effects of adverse events. First, the establishment of basic schema for preparedness and response, including the specification of member roles, is critical. It becomes like an autopilot function of the SN, enabling swift action under familiar changes and freeing up resources for dealing with the less familiar changes arising after the onset of an adverse event. Second, active involvement of all SN members, both upstream and downstream, is important for ensuring that the best-suited members take on roles and responsibilities for the benefit of the entire SN. As our results show, the higher (lower) the predictability of an adverse event, the better it is to push major roles and responsibilities for preparedness further downstream (upstream). Third, adverse events can offer opportunities for changing the SN. Consciously seeking them out and exploiting them can help to counter their disruptive impact. Therefore, member alertness to opportunities arising from the onset of an adverse event is an asset that enables the network to change its fortunes for the better in otherwise grim circumstances. Fourth, identifying the bottleneck in the overall SN in the response phase can also help to balance push and pull activities thereby avoiding placing excessive burden on some members of the network. Thus, there needs to be a high

level of awareness within the SN and key members should have the flexibility to take on new roles as well as give up others if necessary (role (re-) assignment in the response phase) to ensure better overall outcomes for the network.

Limitations and Implications for Future Research

Because of the novel approach and exploratory nature of our research, there are several implications that our findings carry, as well as research limitations, for future research. Firstly, we develop a set of propositions for further validation in future research.

Secondly, in studying SN resilience, we study drew on data from adverse events affecting the demand-side of the SN only. While there is evidence of knock-on effects impacting upstream members in our data (e.g., the negative implications of the IT upgrade for SN responsiveness) and in theory (e.g., Zheng et al., 2019), we anticipate that adverse events originating further upstream in a SN would require different considerations and responses downstream of the event. For example, as the adverse event happens further away from the end-customer, the need to adapt schema could be more pronounced- similar to notions in the bull-whip effect. Therefore, we suggest the investigation of adverse events originating upstream in future SN resilience research capturing potential downstream member interactions and how, in turn, they contribute to performance outcomes.

Thirdly, our data showed substantial heterogeneity among the SN members, which we did not explore further as it was beyond the scope of our initial inquiry. Especially for future research into SN resilience strategies, there is a need to zoom in on the significance of these differences relative to the respective roles of individual members of the SN. This would enable researchers to better capture and understand issues of complementarity and synergies that enable resilience when these members interact. Understanding the significance of heterogeneity among network members would also help to explain and resolve some of the divergent findings in research concerning the formative elements of resilience (e.g., Jüttner and Maklan, 2011).

Fourthly, it would be worthwhile to explore the link between SN members' roles and their (i) capabilities and (ii) interactions with others. Regarding capabilities, the members' roles can be thought of as determining the nature and extent of their involvement in particular situations thereby dictating their capabilities profile that

feeds into the SN's portfolio of capabilities (Craighead et al., 2007; Pettit et al., 2013). Furthermore, it is clear that some of the roles require dynamic capabilities (e.g., role floating and role exploration) while others require operational (also called ordinary) capabilities (e.g., role assignment based on the position of the member within the network) (Hitt et al., 2016). Together, the member roles and capabilities should shape the extent of involvement in such things as distributing authority (e.g., to whom and by whom?) and collaboration (e.g., with whom, to what end, and for how long?). Establishing these links would enhance decision-making for managers who now face a dizzying list of what they should do within their SNs to be resilient (Ali et al., 2017; Tukamuhabwa et al., 2015).

Finally, the results of the quantitative study also provided insights into structural elements of a SN in relation to resilience, that we did not explore in detail as they were also beyond the scope of this study. In particular, and as mentioned in the cross-case analysis section, we found that nodes with close virtual proximity to the affected node benefited from the adverse event and experienced improved performance. On the contrary, spatially proximate ones were negatively affected. Hence, for future research, we suggest an exploration of the effects of SN design from a social network perspective (to capture member interactions) versus design from a structural perspective on resilience.

Chapter 3 Appendices

APPENDIX I: Demand from End-Customers from 2008 to 2011

		YEAR				TOTAL
		2008	2009	2010	2011	
Demand quantity (units)*	Annual (millions)	137.6	136.0	224.5	149.9	648.0
	Increase from previous year	-	-1.2%	65.2%	-33.2%	-
	Fulfilled from stock	1.4%	2.1%	3.2%	3.7%	2.7%
	Fulfilled via direct purchase	98.6%	97.9%	96.8%	96.3%	97.3%
	From ongoing operations [†]	100.0%	99.5%	92.2%	93.2%	95.6%
	From emergency response operations due to adverse events ^{††}	0.0%	0.5%	7.9%	6.8%	4.4%
Total value (€)**	Annual (millions)	12,4	12.4	29.1	20.5	74.4
	Increase from previous year	-	0.3%	134.1%	-29.4%	-
	Fulfilled from stock	12.3%	14.4%	16.0%	20.8%	16.4%
	Fulfilled via direct purchase	87.7%	85.6%	84.0%	79.2%	83.6%

* This is the overall demand measured as the sum of ordered quantities for all of order lines processed during the data period

** Total price of all ordered items excluding last mile shipping and distribution costs

[†] Includes adverse events that were absorbed within regular operational structures (e.g., demand surge caused by a warehouse raid, long term response to adverse events, and small disease outbreaks).

^{††} Demand from additional operational structures that were set up to deal with major adverse events that could not be absorbed within regular operational structures or demand caused by preparedness for foreseeable adverse events. This includes 14 end-customers over the entire data period; in 2010, eight countries were affected.

APPENDIX II: List of Variables- Description and Measurement

DEPENDENT VARIABLE			
	Variable	Remark(s)	
	Delivery delay of order line i	Measured in days (negative if early)	
MAIN INDEPENDENT VARIABLES: NETWORK AND NODE LEVEL EFFECTS			
Category	Variable	Remark(s)	
SN level	Dummy Dt for timing Ei of response to event ei (e.g., Floods response, Pakistan)	4 dummies for the responses to each of the 4 adverse events, baseline category: situations before and after the response to each event	
Node level	Dummy De for end-customer (node) ci affected by an adverse event (e.g., Haiti)	3 dummies for each of the 3 end-customers affected by adverse events, baseline category: unaffected end-customers	
OTHER (CONTROL) VARIABLES			
Category	Variable name	Type	Measurement; No. of categories
Time period	Period	Categorical	¼ of a year; 6
Proximity	Virtual proximity	Categorical	Portfolio pi with countries ci; 4
	Spatial proximity	Categorical	Adapted United Nations geographic region groups; 12
Product characteristics	Product type	Categorical	Adapted SN's product classification; 10
	Drugs	Dichotomous	1 for medicinal drugs; 0 otherwise
	Special requirements (e.g. storage)	Dichotomous	1 for special requirements; 0 otherwise
Order-related aspects	No. of items per order	Continuous	Count
	No. of vendors per order	Continuous	Count
	Price (per order line)	Continuous	Euro (€)
	Volume of shipment	Continuous	Litres
	Air transport mode	Dichotomous	1 for air transport; 0 otherwise
VARIABLES CONCERNING SN MEMBERS AND CONDITIONS			
Category	Variable	Type	Measurement; No. of categories
Upstream members	Supplier ranking	Categorical	In terms of awarded orders; 5
	3PL provider	Continuous	Processing time in days
	No. of ongoing responses*	Continuous	1 event to 4 events at a time
Downstream conditions	Response setting ()	Categorical	Conflict, post-conflict, other; 3
	State fragility	Continuous	State Fragility Indices (2010)
	End-customer ranking	Categorical	In terms of orders generated; 5
	Duration of ongoing operation**	Continuous	No. of months a particular project runs for
	(Ongoing operation) Starts and ends in 5-year period	Dichotomous	1 if operation starts and ends from 2007 to 2011; 0 otherwise
	(Ongoing operation) Running 3+ yrs in 5-year period	Dichotomous	1 if operation runs at least 3 years from 2007 to 2011; 0 otherwise

* Dropped because of collinearity with node-level variable: Pakistan; Pearson Correlation: 0.88

** Dropped because of collinearity with downstream factor: Ongoing for 3+ years in 5-year period; Pearson Correlation: 0.94

APPENDIX III: Interview Protocol

	RELEVANT FOR:	TIMING	
		2010 Events*	General
<p>What are your procedures for dealing with sudden onset disasters [i.e., adverse events]?</p> <ul style="list-style-type: none"> - How do you prepare for them? - How do you deal with unexpected outcomes once a disaster response has started (e.g., insufficient supplies, changes in possible routes, information blackouts)? - Do you have pre-arrangements with your suppliers and customers? <p>An analysis of data obtained from the interface organisation [Study I] on performance with respect to delivery delays experienced for ongoing operations in 2010 (one of the worst years in terms of disasters) was performed, results show that in general the performance of the supply network improved/ was negatively affected/ not affected during this period [state whichever is applicable], may you explain what happened within your organisation?</p> <ul style="list-style-type: none"> - What was/ is more important to you in this/ these situation(s) (e.g., overall performance of the supply chain or performance of your organisation)? <ul style="list-style-type: none"> ▪ Were/ are there (deliberate) trade-offs made in this/ these situation(s), e.g., in terms of costs borne by certain members of the supply chain? <p>(How) did/ do you (try) to ensure that on-going operations (e.g., in terms of supplies, transport, order processing) were/ are not affected by sudden onset disasters?</p> <ul style="list-style-type: none"> - How successful were/ have you been in this regard? - What challenges did/ do you face in this area (e.g., resource capacity (warehouse space, order sizes, other logistics related))? <ul style="list-style-type: none"> ▪ Did/ have you successfully deal/ dealt with them? Why/ why not? - How much involvement did/ do your clients/ suppliers have in the process? What did/ do you do specifically? - Do/ did certain issues take priority over others (e.g., clients, costs, speed etc)? <p>In your opinion, what are the most important factors for ensuring that ongoing operations are not negatively impacted by sudden onset disasters?</p> <ul style="list-style-type: none"> - Does this apply for your commercial clients as well? <p>Customs brokerage is one of your 3PL provider's/ your specialties [state whichever is relevant]. How come you/ the interface organisation [state whichever is relevant] does not use this service?</p> <ul style="list-style-type: none"> - Did this remain unchanged in 2010/ have there been instances in which this service has been used? 	All members		x
	All members	x	
		x	x
	All members	x	x
	All members		
	All members		
	All members		
	3PL provider		
	Interface organisation;		
	3PL provider	x	x

* Where relevant, questions were asked per event: Earthquake Case, Cholera-H Case, Cholera-C Case, Floods case

APPENDIX IV: Coding Tree

Complex Adaptive Systems Features (3 rd order categories)	Link to resilience† (3 rd order categories)	Emergent codes (2 nd order themes)	Examples of representative quotes (1 st order concepts)
External†	PREPAREDNESS PHASE Anticipation	Facilitator†/ Inhibitor†	“[For the cholera outbreak in Chad] [they] had a pretty decent emergency stock (...). It is not so much a supply wolf (because of the predictability of the event). Supply wolves are typically the large displacements, a bomb, and for certain earthquakes... natural disasters. So, I think in that sense, Chad was lucky in a very morbid sense of the word. Because it was a whole different type of emergency.” (Manager 6, Cholera-C Case; Earthquake Case; general remark) “It’s an incredibly difficult country nowadays to get goods into (so emergency stockpiles could not be created within the country).” (Manager 4, Floods Case)
Internal†	Identification/ Adaptation	Facilitator†	“After every emergency, [an internal evaluation is made to assess] was it enough, should there be anything else? Etcetera. Then for instance, we now we have lots of [additional stock items held mostly in Asia] (...). But in [the time of the earthquake] that was not yet the case.” (Manager 4, Earthquake Case; general remark) “Somewhere it stops (...) of course. How realistic is it to be prepared for [an extreme scenario]? That’s not realistic.” (Managers 1 & 2, General remark) “So, if you know that one supplier is a little bit unreliable, we know that we can also order it from this European wholesaler. The problem here is that we cannot simply shift to some other supplier because of our quality assurance policy. (...) another supplier that we don’t know, where we did not visit the factory etc.” (Manager 11, general remark)
External†	RESPONSE PHASE Identification	Facilitator†	“Because it was an emergency and [the government] acknowledged that (...) [this] allowed us to [ship] everything which we had ready (...) and get it into the country (...). So, it created an opportunity.” (Manager 4, Floods Case) “There’s usually a way (to import vehicles into the country) and that way may take either incredibly long or it will take a little longer than forever. But I think (...), what happened after the earthquake, that not only was forever, it expanded far beyond that. Because simply the authority structure had collapsed. And they were overwhelmed by all the NGOs asking the same question (leading to extreme delays).” (Manager 6, Earthquake Case)

Complex Adaptive Systems Features (3 rd order categories)	Link to resilience‡ (3 rd order categories)	Emergent codes (2 nd order themes)	Examples of representative quotes (1 st order concepts)
Internal†	<p>Identification/ Anticipation</p> <p>Identification</p>	<p>Facilitator†</p> <p>Inhibitor†</p>	<p>“... supplier 2 is already with us for as long as I can remember [and they] run not even the extra mile, they run double the extra mile for us. The [manager] even calls, “I am going on holiday tomorrow, should I postpone it or not, because I heard there is something going on [with one of your end-customers]?”” (Manager 7, general remark)</p> <p>“[We had just installed] a new system in our warehouse like two weeks before (the earthquake struck). It’s really [struck at a] bad moment, because when [we] set up the new system, we had some problems [coping with it]. (...) It took three to four or five months (to adapt to the new system).” (Manager 8, Earthquake Case; general remark)</p>
MEMBER SCHEMA WITH RESPECT TO ROLES‡	<p>PREPAREDNESS PHASE</p> <p>Identification/ Anticipation</p> <p>Identification/ Anticipation</p> <p>Identification</p> <p>Identification/ Anticipation</p>	<p>Role definition†/ Role clarity†</p> <p>Role clarity†</p> <p>Role clarity†</p> <p>Role clarity†</p> <p>Role clarity†/ assignment††</p>	<p>There have been agreements between [the interface organization and the 3PL provider] about how many orders, how many lines (...) we can handle for a day. (...) if there is an emergency or something or more lines, then we will go into overtime to achieve this [and the interface organization pays for the overtime]. (Manager 3, general remark)</p> <p>“But I more intend to say that in principle we execute what the customer wants us to do. (...) We check the number of airlines available which are having the landing rights etc. for (e.g., Port-au-Prince) airport, see whether they can [handle the required shipment volume]. All the pieces of the puzzle will be put on the table and, at the end of (process) the [interface organisation] will make the decision: ok this is what we want. (Managers 1 & 2, general remark)</p> <p>“We are not keeping stock for emergencies. We are just a wholesaler dealing with items you also need in emergency situations. But especially medicines, they have the tendency to expire. So, you don’t keep stock especially for emergencies, where you don’t know whether the emergencies will be there or not.” (Manager 11, general remark)</p> <p>“Do they have the people in the field? Do they have the officer who can arrange the context and that he knows everything about the problem that they could have? What is allowed? When you allow, to send the tools in Pakistan, are you allowed to drive your own car? Do you have the insurance for that? Do you have insurance for your people? What they can do, what they cannot do?” (Managers 9 & 10, general remark)</p>

Complex Adaptive Systems Features (3 rd order categories)	Link to resilience‡ (3 rd order categories)	Emergent codes (2 nd order themes)	Examples of representative quotes (1 st order concepts)
	Identification	Role assignment†	<p>“... For the moment, I am responsible for [emergencies]. So, for any emergency I have to be aware, the emergency has to pass through me first and (...) I have to estimate if it's really needed or not.” (Manager 8, general remark)</p> <p>“(Order routing) depends on the emergency, (...) if there is a medical component it is, of course, much easier to focus on Supplier 3 or to [another competitor]. Logistical supply, if it is for example, emergency shelter and NFI's we go to different [suppliers]. Then we can use our stock in [Asia] or we go to specific suppliers that only focus on that product group. So, it really depends on the kind of emergency and sometimes it also depends what the intervention is ...” (Manager 7, general remark)</p>
	RESPONSE PHASE		
	Reaction	Role enactment†	<p>“For [the 3PL provider] there was no escape. Every shipment gets their involvement and attention. (...) I think in 2010 [shipment volume compared to] 2009 was almost doubled. So, yeah, it also has to go through the door, in and out (...). So, that was a bit challenge...” (Manager 5, general remark)</p> <p>“... A lot of shipments that [were] on the way to Haiti, we routed them to our warehouse here. Because it was not possible to receive the containers in Haiti anyway. So, the containers were underway from the suppliers to Haiti, so we rerouted them (...) to our warehouse. Just to stock it temporarily over here.” (Manager 12, Earthquake Case)</p> <p>“Then we had the cholera on top of it and also the flooding in Pakistan at the same time. So, especially for the cholera, the amount of ringer's lactate that had to be processed through the facility was just impossible to process through the same warehouse. So, [the 3PL provider] were very quick in identifying another location. (...) So, we were not constrained by space. [They] just quickly had a solution. And that's what you expect in these types of situations.” (Manager 5, Cholera-H Case; general remark)</p>
	Adaptation	Role enactment†	<p>“So, if you leave that up to the different stakeholders involved, something will go wrong. You need someone to coordinate these long and elaborated supply chains and even with production elements in it. So, finally we did (the coordination) and we got these goods in before the rainy season in Haiti.” (Manager 4, Earthquake Case; general remark)</p>

Complex Adaptive Systems Features (3 rd order categories)	Link to resilience‡ (3 rd order categories)	Emergent codes (2 nd order themes)	Examples of representative quotes (1 st order concepts)
	Adaptation	Role (re-)assignment†	"Most of the times [our responsibility ends at the port of entry], but for [the earthquake] we also did assist [in the last mile distribution]." (Managers 1 & 2, Earthquake Case)
	Adaptation	Role exploration†	"It's just a matter of exploring our suppliers, hearing things that might trigger us to say, ok what can be done? (...) So, it's having your contacts and exploring your contacts and also being pushy and demanding in the service that you want in fact. Somewhere there is always a solution you have to be convinced of that." (Manager 7, general remark)
	Anticipation/Reaction	Role exploration†	"For instance, [the interface organisation once asked us if we could source a product we have never sold before]. We [started] to investigate [where we could get it from and said], "ok, we can help you, this is the price and [this is the lead time] — yes or no?" So yes, we have a lot of unexpected items that [organisations] ask for in emergencies. (Managers 9 & 10, general remark)
	Reaction	Role exploration	"Okay, as soon as you know there is [a disaster somewhere], we create a kind of a team (with members from Supplier 3 and the interface organisation) ... Well, informally, there is nothing formal but we create a kind of [team] (...), then we say... ok, (...) what do we need to do?" (Manager 12, general remark)

‡ Refined code

† Emergent code

APPENDIX V: Bivariate Correlations

Variable	N	mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
1 Overall delivery delay	27742	12.99	27.62	1																										
2 Haiti	27742		0.00		1																									
3 Chad	27742		-0.13**		-0.07**																									
4 Pakistan	27742		0.23**		-0.07**																									
5 Earthquake response	27742		0.17**		-0.14**																									
6 Cholera-C response	27742		-0.18**		0.15**																									
7 Floods response	27742		-0.17**		0.13**																									
8 Cholera-H response	27742		-0.10**		0.05**																									
9 Period (quarterly)	27742		-0.06**		0.10**																									
10 Virtual proximity	27742		-0.22**		0.39**																									
11 Spatial proximity	27742		0.28**		0.03**																									
12 Product type	27742		-0.16**		0.07**																									
13 Drugs	27742		0.12**		-0.07**																									
14 Special requirements	27742		0.03**		0.00																									
15 No. of items per order	27742	109.21	77.55	0.06**	0.04**	-0.02**	0.11**	0.11**	-0.05**	0.00	0.05**	-0.046**	0.07**	-0.13**	-0.04**	0.02**	-0.12**	0.03**	1											
16 No. of vendors per order	27742	10.50	4.86	0.07**	-0.06**	0.05**	0.26**	0.11**	-0.03**	0.05**	0.07**	0.37**	-0.03**	-0.19**	0.08**	-0.09**	0.69**	1												
17 Price per order line	27742	277.06	597.28	0.03**	0.01**	-0.12*	-0.24**	-0.01*	0.00	0.01	0.00	0.13*	-0.03**	0.05**	-0.09**	0.08**	-0.07**	-0.10**	-0.04**	1										
18 Volume of shipment	27742	1737.89	2895.99	-0.08**	0.05**	0.02**	-0.05**	-0.02**	0.02**	0.06**	0.05**	0.15**	0.03**	0.01	0.04**	0.00	-0.16**	0.31**	0.22**	1										
19 Air transporter mode	27742		0.01		-0.02**		0.07**		0.10**		0.04**	-0.07**	0.10**	0.65**	0.21**	-0.22**	-0.05**	-0.01*	-0.16**	0.00	1									
20 Supplier ranking	27742	2.08	1.63	-0.09**	0.08**	0.02**	0.10**	0.01	0.02**	0.02**	0.03**	0.18**	0.09**	0.14**	0.10**	0.37**	0.10**	-0.13**	-0.28**	0.06**	0.23**	1								
21 3PL provider	27742	30.04	20.55	0.66**	0.08**	0.18**	0.35**	0.18**	-0.09**	0.14**	0.10**	0.48**	-0.17**	0.35**	0.11**	0.46**	0.03**	0.01	0.11**	-0.01	0.97**	0.09**	1							
22 Nature of long-term crisis	27742		-0.04**		0.15**		0.17**		0.10**		0.08**	0.04**	0.06	0.06**	0.03**	0.17**	0.02**	-0.05**	-0.01	0.88**	-0.09**	0.00	0.93**	1						
23 State fragility	27742	18.43	4.28	0.02**	-0.02**	0.24**	0.06**	-0.06**	-0.08**	-0.02**	-0.00*	0.16**	-0.20**	-0.24**	-0.06**	0.09**	0.00	-0.09**	0.02**	0.03**	0.05**	0.00	0.93**	0.13**	1					
24 End-customer ranking	27742	2.15	1.06	-0.08**	-0.04**	0.23**	0.24**	0.02**	0.08**	0.07**	0.128**	-0.06**	1.12**	0.01*	0.07**	-0.09**	0.00	0.18**	0.08**	-0.08**	-0.07**	0.23**	0.06**	-0.10**	-0.02**	-0.73**	1			
25 Starts & ends in 5-year period	27742		-0.05**		0.22**	0.09**	-0.08**	0.02**	0.11**	0.07**	-0.95**	-0.01	0.01	-0.11**	-0.01	0.00	-0.01	-0.10**	-0.03**	-0.01	-0.79**	0.13**	-0.01*	-0.12**	0.18**	-0.08**	0.17**	1		
26 Running 3+ yrs. in 5-year period	27742		0.10**		-0.04**	-0.20**	0.00	0.11**	-0.20**	-0.26**	-0.279**	-0.23**	0.12**	0.11**	-0.04**	0.05**	0.00	-0.06**	-0.09**	0.02**	0.07**	-0.13**	-0.02**	0.17**	-0.25**	0.33**	-0.43**	-0.34**	1	

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed). Blank slots for mean and S.D. correspond to categorical variables

APPENDIX VI: Descriptive Statistics for Categorical Variables

DESCRIPTIVE STATISTICS FOR CATEGORICAL VARIABLES					
DICHOTOMOUS VARIABLES					
Variable	N	True?	Frequency	Percent	
2 Haiti	27242	No	26214	94.5	
		Yes	1528	5.5	
3 Chad	27242	No	25694	92.6	
		Yes	2048	7.4	
4 Pakistan	27242	No	25441	91.7	
		Yes	2301	8.3	
5 Earthquake response	27242	No	18199	65.6	
		Yes	9543	34.4	
6 Cholera-C response	27242	No	18482	66.6	
		Yes	9260	33.4	
7 Floods response	27242	No	17973	64.8	
		Yes	9769	35.2	
8 Cholera-H response	27242	No	21165	76.3	
		Yes	6577	23.7	
13 Drugs	27242	No	17223	62.1	
		Yes	10519	37.9	
14 Special requirements	27242	No	25529	92	
		Yes	2213	8	
19 Air transport mode	27242	No	8670	31.3	
		Yes	19072	68.7	
25 Starts & ends in 5-year period	27242	No	25995	93.7	
		Yes	1747	6.3	
26 Running 3+ yrs in 5-year period	27242	No	9259	33.4	
		Yes	18483	66.6	
OTHER CATEGORICAL VARIABLES					
Variable	N	No. of categories	Frequency range	Percent range	
9 Period	27242	6	2975 – 6577	10.1 - 23.7	
10 Virtual proximity	27242	4	4712 – 8617	17.0 - 31.1	
11 Spatial proximity	27242	11	9 – 7818	0.0 - 28.2	
12 Product type	27242	10	49 – 5716	0.2 - 20.6	
20 Supplier ranking	27242	4	2249 – 17944	8.1 - 64.7	
22 Nature of long-term crisis	27242	3	1793 – 20010	6.5 - 72.1	
24 End-customer rating	27242	5	81 - 9442	0.3 - 34.0	

CHAPTER 4

Is the Humanitarian Ambition Alive? Linking Humanitarian Action and Operations Management Perspectives to Explore Strategy and Outcomes in Hostile Environments

Abstract

Insecurity has become a major issue in international humanitarian operations further casting doubt on the viability of the humanitarian ambition to meet needs wherever they exist. Aid workers and international humanitarian organisations (IHOs) face increasing hostility. As the debate on the effectiveness of IHOs in delivering assistance in conflict environments rages on in the field of humanitarian action (HA), it is important to develop a deeper understanding of the implications of insecurity for the delivery of humanitarian assistance. In this paper, we merge the HA and operations management (OM) perspectives to diagnose the state of the humanitarian ambition in conflict environments. We employ operations strategy to explore the strengths and limitations of IHOs' *modi operandi*, i.e., typical ways of working. We have two major findings. First, our results show that certain *modus operandi* elements of individual IHOs seek to improve operational conditions. When successful, this leads to spillovers that benefit the humanitarian sector across conflicts. Second, despite these spillovers, diversity of sourcing strategies within conflicts is also crucial for improving overall outcomes. For HA, our results lend support to argument that observing the humanitarian principles of humanity, neutrality, impartiality, and independence has indispensable value when providing assistance. This is linked to the best operational outcomes, albeit with some limitations.

Key words: Insecurity, Humanitarian Action, Sourcing Strategy, Trade-offs

4.1 Introduction

The humanitarian ambition to alleviate suffering *wherever it may exist* (Calhoun, 2008) is under siege as International Humanitarian Organisations (IHOs) conduct operations in increasingly hostile environments. The humanitarian landscape is now characterised by worsening security challenges (Alexander and Park, 2021; Larson, 2021; Schneiker, 2013; Spieker, 2011) amid unprecedented and growing humanitarian needs². A pressing question in the fields of humanitarian action (HA) and operations management (OM) is whether, given this grim reality of the humanitarian landscape, IHOs' strategies can improve performance outcomes and keep the ambition alive (e.g., Donini et al., 2006; Galindo and Batta, 2013; Pettit and Beresford, 2009; Spearin, 2008; Starr and Van Wassenhove, 2014). Evidence from practice shows that IHOs achieve different levels of success within and across conflict environments but cannot agree on how international humanitarian assistance should work (see, e.g., MSF, 2014; Stoddard, 2014; Taithe, 2014). From this, it is apparent that the vulnerability of different IHOs to the same environmental conditions varies and we argue that a single IHO cannot singlehandedly fulfil the humanitarian ambition. However, it remains to be established whether differing vulnerabilities enable IHOs to collectively (i.e., at the sector-level) achieve good operational outcomes in different conflict environments and if, by extension, the humanitarian ambition is still alive.

This research diagnoses the state of the humanitarian ambition in international humanitarian assistance for conflict victims. To this end, we merge the dominant, yet fiercely contested perspectives, in the HA and OM fields about operational success. The dominant view in HA focuses on overall operational success stipulating that principled humanitarian action, i.e., strictly abiding by the humanitarian principles of humanity, neutrality, impartiality, and independence in all aspects related to providing assistance, enables the best operational outcomes in any insecure context (Barnett and Snyder, 2008; Barnett and Weiss, 2008; Collinson and Elhawary, 2012; Donini et al., 2006; Tomasini and Van Wassenhove, 2009). The dominant OM view focuses on operational aspects and is predicated on the trade-offs model whose central

² The United Nations Coordination for Humanitarian Affairs (UNOCHA) estimated that (i) they would need US\$25 billion in 2019, a record high, to respond to conflict-driven crises alone. By 2021, (ii) this figure had risen 40% to US\$35 billion. Sources: (i) <https://www.unocha.org/story/us219-billion-needed-2019-average-length-humanitarian-crises-climbs> (ii) <https://gho.unocha.org/#:~:text=in%202021%2C%20235%20million%20people%20will%20need%20humanitaria,n,which%20was%20already%20the%20highest%20figure%20in%20decades>. Accessed on 24 July, 2021.

argument is that resource scarcity makes it impossible to prioritise all performance objectives of cost, quality, speed, flexibility, and reliability. Hence, regardless of the context, no single organisation can thrive on all operational aspects (e.g., Boyer and Lewis, 2002; Sarmiento et al., 2018; Skinner, 1996; Sum et al., 2004). Thus, although both HA and OM perspectives are concerned with the best possible outcomes, they seem to address different aspects of this problem. HA focuses on operational success across environments with the claim that the best chance at achieving it is through principled action but without delving into its limitations or, in other words, trade-offs to be made. In contrast, OM focuses on success in specific environments subject to trade-offs arguing that success on one operational dimension implies performing less well on another (e.g., achieving speed in humanitarian operations comes at a high cost); it does not address how the same trade-offs play off across environments. The main conclusion to be drawn is that because of inevitable trade-offs, individual IHOs have particular strengths and limits that have implications for the humanitarian ambition at the sector level; these may be the same or differ across conflict environments. Since different conflicts impose different constraints on IHOs, e.g., social changes, and political conditions (Badri et al., 2000; Krajewski and Ritzman, 1996; Liu et al., 2018), it is important to develop a better understanding of how trade-offs play off and with what implications for these strengths and limitations at both organisational and sector level.

To explore these relationships and facilitate a much-needed objective diagnosis of the state of the humanitarian ambition (Abiew, 2012; Bennett et al., 2016; Taithe, 2014), we adopt OM as the dominant perspective (Galindo and Batta, 2013; Pettit and Beresford, 2009; Starr and Van Wassenhove, 2014). Specifically, we superimpose the so-called *modus operandi* of IHOs on the OM perspective and explore strategies employed in HA primarily in the OM domain. Simply put, an IHO's *modus operandi* is its typical way of working and reflects its identity and values. The identity-centric roots of the *modus operandi* align with the OM notion that organisational identity informs operations strategy (OS) (e.g., Slack and Lewis, 2008). Two important *modus operandi* elements pertain to (i) IHO goals (e.g., to witness the plight of affected populations and educate warring parties on their responsibilities towards civilians) and (ii) how they work. The latter includes the decision to either do the work themselves or through others- essentially sourcing strategy in OM. We explore two

main questions, focusing on the organisational and sector levels: (1) How, and for what purpose, do individual IHOs' *modi operandi* inform their coping strategies in different conflict environments; what are the operational implications? (2) What are the implications of different IHOs' coping strategies for OM outcomes across conflict environments?

We adopt a case-study approach to explore these issues in their real-world context given the contextual complexity and limited literature (Eisenhardt and Graebner, 2007) on HA in OM and vice-versa. This enables us to obtain in-depth insights on how and why (Eisenhardt, 1989a; Voss et al., 2002; Yin, 2009) different IHOs are affected by, and respond to, security challenges across conflict environments. Furthermore, our focus on conflict settings leads to significant contributions to theory regarding OS for hostile environments as these are extreme and remain rare in OM (Bamberger and Pratt, 2010; Craighead et al., 2020).

This research makes three key contributions. First, we incorporate the environmental factors which are recognised as crucial but underexplored in OM (e.g., Liu et al., 2018). This enables us to add nuance to the trade-offs discourse in OM by showing that the same strategies lead to different trade-offs in different environments. Thus, in addition to the trade-offs that are the results of strategic choices, our research shows that trade-offs can also be imposed by the environment. Second, our interdisciplinary approach exposes the shortcomings of the "best practices" view to achieving the best possible outcomes that dominates OM thinking in the context of hostile environments by showing that the same capabilities cannot be replicated across different environments. In exchange, it uncovers how varied organisational strategies, both formal and implicit (Tunälv, 1992), can enhance overall outcomes in hostile environments. Third, we contribute to the long-standing debate in HA about IHO practices in conflict settings (e.g., Adami, 2021; Donini and Maxwell, 2013; Fast et al., 2013; Hilhorst et al., 2016; Roepstorff, 2020; Taithe, 2014) and generate insights on HA-specific issues in hostile environments that can inform future OM research in this underexplored domain (Jola-Sanchez et al., 2016).

The rest of this paper is organised as follows. In section 2 we review the literature on the background of HA and related OM considerations. The research methodology is

presented in section 3, followed by a presentation of the findings in section 4. The discussion and conclusions follow in sections 5 and 6 respectively.

4.2 Literature Review

In this section, we synthesise the HA and OM literature to develop an initial framework for investigating the state of the humanitarian ambition for IHOs in conflict settings. We first present the key HA issues in conflicts and the IHOs strategies for dealing with them. Thereafter, we link these issues and strategies to OS with a focus on sourcing strategy and OM objectives. We then discuss the additional impact of the environment and present our initial research framework.

Key Issues in Humanitarian Action

Humanitarian assistance is the main HA activity which entails providing disaster victims with life-saving goods and services (Spieker, 2011) and differs from commercial enterprise in two significant ways. Firstly, donors, rather than end-customers (i.e., beneficiaries), drive the market requirements because they fund the IHOs (Moxham, 2009). This can lead to inefficiencies on the customer-facing operations, e.g., because earmarked funding does not allow for adapting plans to changing needs (Burkart et al., 2017). Secondly, performance objectives in humanitarian assistance tend to be loosely defined (e.g., Tomasini and Van Wassenhove, 2009), e.g., in terms of having access and meaningful operations.

Most humanitarian operations, including responses to natural disasters, are conducted in conflict-affected countries (e.g., Rottkemper et al., 2011). Conflicts create extreme needs and human suffering while posing major security threats for aid workers (Abiew, 2012). Access to affected populations is the prerequisite for conducting operations (Spieker, 2011). To secure and maintain access, means of operating safely in conflicts have been widely discussed and debated for decades in the HA literature (e.g., Adami, 2021; Bradbury et al., 2000) without any consensus being reached. The most dominant approach is the adoption of principled humanitarian action, i.e., observing the humanitarian principles of neutrality (not taking sides in a conflict), impartiality (non-discrimination in providing assistance), independence and accountability, regardless of the political situation (Hilhorst, 2002; Leader, 2000; Pictet, 1979). International Humanitarian Law and Human Rights Law are the main frameworks that have been developed to facilitate principled humanitarian action.

They obligate governments to allow humanitarian organisations unconditional access to populations in international and civil conflicts, respectively (Haider, 2013). Governments must also facilitate speedy distribution of supplies by preventing the diversion of relief items, e.g., through looting (Spieker, 2011). These frameworks are meant to create the necessary apolitical working space where humanitarian assistance norms are respected, i.e., humanitarian space (Bradbury et al., 2000; Minear, 2019).

Trends in contemporary conflicts suggest that these frameworks are not always effective as IHOs are struggling for solutions to insecurity (Bradbury et al., 2000). One reason for this could be that some key assumptions informing these frameworks may now be invalid (Spiegel, 2017). For example, parties to the conflict increasingly lack discipline and have no respect for the humanitarian ethos (Spearin, 2008). In efforts to address these shortcomings, security strategies have been incorporated into IHO MOs and refined over time.

IHO Identities and Modus Operandi

The centrality of identity and values in driving IHOs' decisions in conflict environments is demonstrated in at least two ways. IHOs, like other not-for-profit organisations, base their existence on a social mission and this defines what they stand for (Quarter and Richmond, 2001). Furthermore, they primarily rely on their identity and values when developing approaches to respond to security-related challenges (Schneiker, 2013). We discuss each of these in turn in this section.

Strategy in Humanitarian Organisations – an Anecdote

IHO strategies are not well-documented in OM but not-for-profit organisations are generally complex and continuously changing with the environmental factors that led to their emergence (Olson et al., 2005). Prominent IHOs have split over internal disagreements about the implications of new ways of working for their identities and values in wartime situations. A notable example is MSF, founded by doctors who volunteered for the French Red Cross in the Biafra conflict and viewed the organisation's decision not to publicly report attacks on civilians as complicity (Bradbury et al., 2000). In order to safeguard its independence, MSF chose to strive for non-institutional funding and to directly provide all services to beneficiaries (i.e., insource all aspects of their operations). This would enable them to speak out against atrocities they witnessed first-hand in their daily work. Ironically, less than a decade

later, Médecins du Monde (Mdm) split from MSF over what they considered to be MSF's failure to uphold its principle of speaking out when they assisted Vietnamese refugees on the South China sea. Mdm chose to partner with different institutions (i.e., outsource certain aspects of their operations), also reflecting their belief that humanitarian assistance should be coupled with long-term development goals. Even though MSF and Mdm were formed in response to emergent environmental triggers, it appears that decisions about operational setup were driven more by idealism than operational considerations. This warrants an investigation into whether a single IHO can thrive operationally given this approach to establishing OS- whether explicit or implicit.

The preceding narrative also casts doubt on the argument that humanitarian principles are universal. The proliferation of IHOs has led to different interpretations, operationalisation approaches, and even challenging some of the principles (Barnett and Weiss, 2008; Bradbury et al., 2000; Schneiker, 2020; Stoddard, 2003; Weiss, 1999) leading to distinct IHO identities despite having shared values, beliefs, and norms. It is, therefore, not surprising that the debate on the effectiveness of IHOs has largely focused on IHO identities and linked them to their operational decisions (Adami, 2021; Collinson and Elhawary, 2012; Barnett and Snyder, 2008; Barnett and Weiss, 2008). The real effect of principled action has increasingly blurred as it appears as though the application of the same principle by different IHOs leads to different outcomes. The operational implications of this development are not well-understood. For instance, can a single IHO have multiple interpretations of the same principle and what would this imply for outcomes across conflict environments?

Security Strategies

An important modus operandi element for insourcing IHOs is related to the security strategies that they employ to improve their security situation in conflict settings as they have major implications for principled action and operational effectiveness. Security strategies can be broadly categorised as acceptance, deterrence, and protection (Humanitarian Practice Network, 2010). These strategies are referred to as the security triangle and have become an integral part of the modus operandi of IHOs that insource their operations in part or in full. Acceptance reduces security threats by enabling IHOs to secure support for their operations through building relationships with the community and other relevant stakeholders (Beerli and Weissman, 2016;

Kalkman, 2018). Protection reduces vulnerability to security threats through hardening the target or altering its visibility, e.g., keeping a low or high profile, bunkerisation, and using armoured vehicles. Deterrence entails posing a counter-threat to discourage would-be attackers, e.g., the use of armed protection and diplomatic leverage (Beerli and Weissman, 2016).

Acceptance is the most preferred security strategy. From an HA perspective, it is highly consistent with the humanitarian principles (Beerli and Weissman, 2016; Fast, 2015; Schneiker, 2015). From an OM perspective, it arguably leads to the best outcomes in terms of operating costs as there are no major investments in security-related issues. This strategy is difficult to execute, however, because any negative perceptions about IHOs can increase their security threats. For example, there is growing disdain for Western powers and values in conflicts drawing in global actors and IHOs experience targeted attacks there because they are perceived as instruments of the west (Beerli and Weissman, 2016; Fast et al., 2013).

Protection and deterrence create a distance between IHOs and local communities (Duffield, 2012) which can cause alienation (Fast, 2015; Schneiker, 2015) and make resumption of activities even more difficult if operations are disrupted. In addition, the use of armed protection violates humanitarian principles (Bangerter, 2008; Schneiker, 2013). These issues have compelled IHOs to increasingly rely on remote management as a fourth strategy. Under remote management, senior personnel (local or international) are withdrawn from a project location and manage operations from a distant location (Donini and Maxwell, 2013; Egeland et al. 2011; Kalkman, 2018; Stoddard et al. 2010). The main limitations of remote management are that it is an incoherent strategy and the loss of direct access (Andersson and Weigand 2015; Donini and Maxwell, 2013; Kalkman, 2018). IHO staff are often compelled to ship items to recipients that they have never met and no party can guarantee the safe transport and storage of materials (Direct Relief, 2017). This has raised questions about how much access aid workers truly have under such circumstances and whether needs can be adequately met (Menkhaus, 2010).

Humanitarian Action from an Operations Strategy Perspective

Performance Objectives and Outcomes

We begin this section by highlighting the difficulty of assessing performance outcomes in humanitarian operations because of the loosely defined objectives and data collection challenges (Anjomshoae et al., 2017; Blecken, 2010; Tomasini and Van Wassenhove, 2009). Performance objectives are even harder to establish because the customer-centric view to performance measurement in the traditional OM sense is compromised in HA. To address this challenge, performance outcomes can be determined by assessing IHOs' capacities to *repeatedly and reliably* conduct operations, at the very least, function as intended and in a minimally satisfactory way (Helfat et al., 2007; Helfat and Winter, 2011; Winter, 2000). In HA, we argue that this implies that to fulfil the humanitarian ambition, IHOs must at least have the capacity to consistently provide goods and services that sustain life despite the challenges faced. For instance, achieving and maintaining continuity is an ongoing struggle in conflict settings due to multiple risks and uncertainties related to insecurity (Larson, 2021; L'Hermitte et al., 2014). How this is achieved from an OM perspective is one of the things we explore in this research.

Although commercial standards of acceptable performance cannot be applied to the humanitarian setting, specific OM measures are highly relevant for HA. For instance, delivery speed is essential in humanitarian operations- lives are lost if assistance arrives too late (Overstreet et al., 2011). One way of simplifying the task of linking performance objectives to outcomes is to evaluate OM objectives on the basis of widely observable characteristics like cost, quality, and delivery (Sarmiento et al., 2016 & 2018). We adopt this approach in this research and focus on determining OM performance objectives (referred to as OM objectives hereafter) and related performance outcomes.

Sourcing Strategy

As sourcing strategies of IHOs are not well-documented, we merge insights from HA with OM concepts to theoretically identify and assess key issues in IHO operations in conflict settings.

In OS, capabilities and resources needed for enhancing competitive advantage are increasingly seen as residing both internally within the organisation and externally

with an organisation's suppliers (Brown et al., 2010; Fawcett et al., 2011; Holcomb and Hitt, 2007). An organisation can either leverage its internal resources, knowledge, and capabilities, or those of external suppliers to build its competitive advantage (Kroes and Ghosh, 2010). Thus, insourcing and outsourcing decisions are strategic means towards achieving a competitive advantage. Neither outsourcing nor insourcing is inherently superior. Both strategies are used to meet the performance objectives of organisations. These are namely, cost (e.g., related to economies of scale, processes, and fixed versus variable costs), quality (e.g., conformance to standards), speed (e.g., short lead times and good process management capabilities), flexibility (e.g., to respond to uncertainty caused by variation in demand) (Chopra and Meindl, 2013; Dabhilkar, 2011; Kroes and Ghosh, 2010; Mangan et al., 2012).

Outsourcing mainly enables organisations to achieve greater efficiency by avoiding duplication of major investments and delegating a task to a more specialised external supplier but they must also effectively manage their relationships with, and monitor the performance of, their suppliers (Dabhilkar, 2011; Fawcett et al., 2011; Plugge et al., 2013; Richards, 2011). Outsourcing organisations can also concentrate on their core capabilities while gaining immediate access to economies of scale (e.g., by allowing a supplier to pool demand from several buyers); and new capabilities with little investment (thereby incurring lower costs) while also spreading risks (e.g., those inherent to massive investments) (Bolumole, 2001; Kim and Park, 2010; Richards, 2011; Ulrich and Ellison, 2005; Yan et al., 2019; Zhu et al., 2017). Some of the outsourcing risks that organisations need to mitigate include harmful supplier behaviour like slowing down logistics processes, technological changes, and transaction specific assets (Hibbert, 1993; Kim and Park, 2010; McIvor, 2009; Tayles and Drury, 2001). Inexperienced outsourcing organisations are at great risk of failing to achieve desired outcomes like achieving good quality, flexibility, and sustaining good revenue (Bossche, 2017; Deloitte, 2015). Thus, when making an outsourcing decision, an organisation has to ensure that it is not outsourcing its core business and that the arrangement will yield the intended additional value (Handley and Benton, 2009; McIvor, 2011).

Insourcing is seen as a way of avoiding the risks of outsourcing. It enables organisations to avoid spill overs to current and future competitors as well as ensure responsiveness to unforeseen environmental challenges or changes because there is

no need to re-negotiate terms with a supplier (Ulrich and Ellison, 2005). However, if insourcing organisations seek global presence, this places substantial demands on managers as they must cope with an array of environmental demands (Greenwald and Kahn, 2005). It, therefore, seems that IHOs that extend themselves globally (by operating in multiple conflict environments) will underperform in at least some conflict environments. This thinking is reinforced by the trade-offs model which presupposes that, even within the same environment, an organisation cannot be good at everything (e.g., offering high quality products at a cheap price) (Boyer and Lewis, 2002; Sarmiento et al., 2018; Sum et al., 2004). This suggests that IHOs attempting to meet needs wherever they may exist will be outperformed by those that focus on specific environments.

Since organisations should not outsource their core businesses (McIvor, 2011), they often use a combination of insourcing and outsourcing to maximise their competitive position in the market. Properly balancing outsourcing and insourcing decisions creates diversification opportunities (e.g., developing new knowledge through insourcing while improving efficiency through delegation of work to external suppliers) (Hsiao et al., 2010; Parmigiani and Mitchell, 2009; Yeung et al., 2012). Thus, a combined sourcing strategy may help to overcome the limitations of insourcing and outsourcing. IHOs also make clear choices with respect to insourcing and outsourcing with some, indeed, using a combination of the two which may enable better performance across conflict environments. It is, however, not immediately clear what either organisation sought to, or would, achieve with respect to the performance objectives. Furthermore, the unique and diverse nature of conflicts as an operating environment (Krähenbühl, 2004) limit our ability to draw on conventional wisdom to establish this.

The Role of the Environment

OS research has tended to neglect nondiscretionary environmental factors despite their strong influence on competitive advantage and performance (e.g., Badri et al., 2000; Cooper et al., 2006; Flynn et al., 1995; Greenwald and Kahn, 2005; Liu et al., 2018). Including environmental factors in the analysis of OS is essential as their varied influence on organisational performance is accounted for in measures of, e.g., operational efficiency (Liu et al., 2018; Oltra and Flor, 2010). Although the need to ascertain the environmental conditions under which OS-performance relationships

are positive in OM research has long been established (Badri et al., 2000; Swamidass and Newell, 1987), the research remains nascent (e.g., Anand and Gray, 2015; Jeihoon et al., 2019).

Influential environmental factors include laws and regulations imposed by governments, economic trends, social changes, and political conditions (Badri et al., 2000; Krajewski and Ritzman, 1996). In humanitarian operations, multiple factors can be identified. For instance, parties to the conflict often hinder distribution and other logistics activities (Dube et al., 2016; Kovacs and Spens, 2009; Kunz and Reiner, 2012; Pettit and Beresford, 2005). They also increasingly lack discipline and have no respect for the humanitarian ethos with some deliberately committing war crimes like attacking civilians, conducting mass murders and kidnapping as a form of warfare (Bangerter, 2008; Spearin, 2008). Criminal activity is also on the rise as state actors are losing control to, and being replaced by, “bandits and anarchists” whose agendas are informed by “greed and grievance” (Berdal and Malone, 2000). Technological advancements in the small arms industry and last mile logistical challenges have further worsened security challenges. Warring parties easily access arms while a collapse in command structures of armed groups fuels conflict (ICRC, 2014; Leaning and Guha-Sapir, 2013). Another complicating issue is that although most modern-day conflicts are civil, they draw in global actors who are polarised and/ or radicalised (Beerli and Weissman, 2016; Krähenbühl, 2004).

Including environmental factors in the analysis of OS is essential as their varied influence on organisational performance is accounted for in measures of, e.g., operational efficiency (Liu et al., 2018; Oltra and Flor, 2010). For IHOs, a major issue affecting efficiency in conflict settings is environmental complexity and dynamism which lead to frequent disruptions and creates uncertainty by causing information deficits that make it difficult to understand cause and effect relationships (Carpenter and Fredrickson, 2001; L’Hermitte et al., 2016; Long and Wood, 1995; Sirmon et al., 2007; van der Laan et al., 2009). In turn, uncertainty affects the strategies, resources (type and amount) and capabilities that an organisation needs and/ or can leverage to maintain a competitive advantage (Sirmon et al., 2007). Logistically, poor public infrastructure, a lack of basic communication devices, remoteness of affected areas, excessive check points, and travel restrictions impede movement and access (Bangerter, 2008; Direct Relief, 2017). Furthermore, IHOs typically suspend

operations if there are serious or fatal aid worker attacks further disrupting operations (e.g., Schneiker, 2013; Stoddard et al., 2017). All these factors impede performance and must be considered when evaluating the performance of IHOs from an OM perspective.

The foundational OM literature on humanitarian operations was more focused on the performance outcomes and, thus, the field is yet to fully appreciate the extreme nature of the challenges in this context. Research on humanitarian logistics, for example, has focused on efficiency and optimisation strategies in protracted crises citing the long-term planning horizons (Kovács and Spens, 2009; L'Hermitte et al., 2016). When the protracted crises are conflicts, however, these strategies are unsuitable because the necessary conditions for pursuing efficiency and optimisation are never met: instability and uncertainty are ever present. Only in the last decade have researchers acknowledged that much could be learned from the humanitarian context as a result of the scale and scope of disruptive events they have to cope with (e.g., Day et al., 2012; Kovács and Falagara Sigala, 2021; Scholten et al., 2014).

Research Focus

This research seeks to understand the relationships between HA and OM considerations that are pertinent to achieving operational success in conflict environments. In HA, IHO identities inform their MOs but this relationship also seems to be influenced by responses to environmental triggers. It is unclear how performance outcomes play out as IHOs apply different strategies in different conflict environments. Although IHOs may attempt to address environmental factors by adapting their strategies, nondiscretionary environmental factors that IHOs cannot influence still affect the relationship between strategy and performance (Cooper et al., 2006; Greenwald and Kahn, 2005; Liu et al., 2018). However, it is also possible for IHOs adopting different operations strategy positions to record similar levels of overall success (Kathuria, 2000; Roth and Miller, 1992; Sum et al., 2004). What this similarity entails and its implications for the sector-level attainment of the humanitarian ambition is one of the questions this research seeks to answer and from an OM perspective.

4.3 Methodology

A lack of established HA and OM literature on different types of conflict environments compelled us to follow a two-stage mixed-methods approach. The first stage was comprised of multiple preliminary steps involving the use of multiple methods ranging from a quantitative content analysis to in-depth qualitative interviews. We undertook these steps to characterise conflict environments and identify the security challenges faced by IHOs in those environments. More importantly, this painstaking approach of taking multiple preliminary steps enabled us to reduce bias and refine insights generated in the overall study through improved triangulation and expansion of findings (Johnson and Onwuegbuzie, 2004; Scholz and Tietje, 2002; Yin, 2009). The first stage also resulted in substantial independent pieces of work that enhance depth and richness of insights on HA and could significantly contribute to how OS in conflict environments is tackled by researchers and practitioners. These works will be published independently from this study. To improve transparency, outcomes of the preliminary steps that are pertinent to this study, i.e., conflict environment characteristics and security challenges, will be briefly presented in section 3.2. In the second stage, which is the focus of this chapter, a qualitative approach using semi-structured interviews was adopted.

Research Approach and Sampling

Because of the complexity of delivering humanitarian assistance in conflict settings and the limited knowledge of the HA field in OM, our approach was to use a multiple embedded case study. This enabled us to explore the problem in its real-world context and generate in-depth insights on how and why (Eisenhardt, 1989a&b; Eisenhardt and Graebner, 2007; Voss et al., 2002; Yin, 2009) different IHOs respond to security challenges across conflict environments as well as their realised outcomes. The embedded design further enabled us to establish patterns (Scholz and Tietje, 2002) of individual IHO decisions across conflict environments and the sector-wide implications within conflict environments.

The main unit of analysis is an IHO. In line with the recommended range of 4 to 10 cases for theory building research (Eisenhardt, 1989a), a total of four IHO cases were selected. We applied a theoretical sampling approach and selected four IHOs that fit into different theoretical categories (Eisenhardt, 1989b). This allowed us to establish if and how the IHOs are affected by, and deal with, insecurity leading to generalisable

findings. The secondary unit of analysis (i.e., embedded unit) is the conflict environment. We identified and validated four types of conflict environments in the preliminary steps (see next section).

We selected the IHOs on the basis of operational perspectives. On the operational perspective, we used the modus operandi as the theoretical sampling criteria because it has direct implications for how an IHO is affected by insecurity and how effective its responses are. We categorised the modus operandi in terms of sourcing strategy (*insource* versus *outsource*) and according to its operational resource base in terms of where personnel in key management positions are recruited from (*local* or *global*). The operational resource base dimension is crucial because, regardless of sourcing strategy, IHOs generally have a mix of international and local staff but make different decisions about where their management staff come from. In any conflict environment, local staff are often an overwhelming majority of the workforce but they do not always have decision-making power. Table 1 shows the four case IHOs chosen on the basis of these criteria. All four IHOs have extensive experience in HA ranging from around 50 years to over 150 years, all have annual budgets above US\$1 billion, and all operate in different conflict environments.

To accommodate the identity-centric approach in HA, we also differentiated between *mandated IHOs* who have a specific directive and are primarily funded by governments and *non-mandated IHOs* that are independent and primarily rely on private donations. This distinction is important in the context of insecurity, because mandated IHOs, in principle, benefit from a higher level of diplomatic protection while non-mandated IHOs have more independence when it comes to approaches taken to deal with insecurity. We note that all insourcing IHOs are non-mandated (i.e., they are independent) while both outsourcing IHOs are mandated by governments (Organisation A) and the UN (Organisation C).

Table 1: Theoretical sampling of IHOs based on their identity and modus operandi

		Sourcing decision	
		<i>Insource (own staff)</i>	<i>Outsource (implementing partners)</i>
Resource base	Global	<p>Organisation B:</p> <ul style="list-style-type: none"> Provides medical humanitarian assistance to people affected by conflicts and other disasters, funded mainly from private sources Works primarily with their own expatriate staff in senior management positions. This allows them to ensure independence and neutrality, and to ramp up operations very fast. 	<p>Organisation A:</p> <ul style="list-style-type: none"> Seeks to ensure humanitarian protection and assistance for victims of armed conflict in line with international humanitarian law, funded mainly by governments. Heavily outsources part of their activities to an established network of societies of the International Federation of Red Cross and Red Crescent Societies (IFRC) through a global framework agreement. This allows them to operate in most countries of the world.
	Local	<p>Organisation D:</p> <ul style="list-style-type: none"> Faith-based development-oriented organization committed to serving those in need and child protection, funded mainly from private sources. Works primarily with local staff, including in senior management positions. This allows them to leverage local know-how and ensure good continuity of operations. 	<p>Organisation C:</p> <ul style="list-style-type: none"> UN-mandated organisation focusing on the protection of refugees including those who are internally displaced, funded mainly by governments of major economies. Organisation C heavily outsources part of their activities to implementing partners it contracts locally (but they may be IHOs). This allows them to leverage local know-how and select the appropriate partner in each country of operation.

Preliminary Research – Methods and Key Results

In this section, we briefly present the key results from the preliminary steps that are pertinent to this study. In the preliminary step, we conducted a quantitative content analysis (Kunz, 2019) of activity reports published by the case IHOs over a six-year period (2010 – 2015). This was our starting point for identifying real-world experiences of the impact of insecurity on humanitarian assistance as conveyed by the case IHOs. Details of the approach are presented in Appendix I. Through this approach, we derived key emerging themes and a working classification for conflict environments.

We continuously refined our themes and conflict typology scheme using information from seven subject-matter experts (primarily researchers and consultants working in the HA field) (Appendix II) and practitioners working for the studied IHOs. The former was primarily part of stage 1 of our study as we sought to validate content analysis findings and the latter were practitioner interviews conducted during the second stage of our study. The final stage of the preliminary step entailed mapping

identified security challenges to the identified conflict environments. We relied on security incident information from the IHO annual reports and looked up the reported incidents in the Aid Worker Security Database³ to gather more details about the attack context and means if available. The practitioner interviews were used as an opportunity to validate the findings and only the typical challenges within and across conflict environments were documented.

Emerging Themes from IHO Reporting on Insecurity

We identified four key dimensions (i.e., insecurity, humanitarian concerns, dealing with insecurity, and OM issues) and nine related themes (Table 2). Appendix III shows the complete list of words coded under each theme.

Conflict Classification

During the manual inspection phase of the content analysis, we recognised some patterns in the nature of security challenges faced in different countries. To capture these patterns and to simplify the analysis, we developed a basic conflict typology and grouped countries according to this classification for our secondary unit of analysis (i.e., conflict environment).

We identified four primary conflict environments: goods-dominated, local (Go-L); creed-dominated, local (C-L); goods-dominated, global (Go-Gl); and creed-dominated, global (C-Gl). The categorisation was based on their reach in terms of the actors drawn into, or with an interest in, the conflict (local versus global) and the dominant issues driving the conflicts (goods versus creed). The term “creed” is an example of one of the refinements we made as a result of interviews with subject-matter experts. We had initially chosen the term “ideology” but found this to insufficiently capture the drivers of non-goods dominated conflicts. A conflict with *global* reach involves multiple countries and often includes governments with military strength. A conflict with a *local* reach mostly draws in local parties, and consists mainly of rebel groups fighting against the government. In terms of the drivers of conflicts, *creed-dominated* conflicts originate from different belief systems or strong differences of opinion (e.g., idealism and religion). In a *goods-dominated* conflict,

³ The Aid Worker Security Database is a Humanitarian Outcomes projects. Established in 2005, it documents major security incidents in the humanitarian sector starting from 1997 to date. Source: <https://aidworkersecurity.org>, Accessed on 4 January 2020.

Table 2: Top four dimensions and themes of codes emerging from the content analysis

Dimension	Theme	Description
Insecurity Words used in direct reference to insecurity	Security challenges	These are largely related to security incidents, means of attack, and real or perceived risks.
Humanitarian concerns Words capturing concerns that are specific to, and highly influential in, the humanitarian setting	Access	The unhindered presence and movement of IHOs to reach and serve beneficiaries (beneficiary access through travelling to the IHOs or their facilities was not covered).
	Values	Broadly speaking, humanitarian values, which entail universal humanitarian principles as well as organisation-specific values and identity.
Dealing with insecurity Words that describe how IHOs (attempt to) deal with insecurity	Mainstream security strategies	Strategies that are part of the security triangle (acceptance, protection, deterrence), remote management, and avoidance were labelled as mainstream strategies because of their widespread recognition and use.
	Networks/partnerships	Loose connections/ long-term meaningful relationships in as far as they were used in response to insecurity.
	Other responses	Words capturing other ways of dealing with insecurity. This includes generic words like “cope” where it was not specified exactly how an IHO coped.
Operations Management Issues Words related to the impact of insecurity from an OM perspective	Performance impact	Captures both OM measures like timeliness and efficiency as well as less concrete measures like unhindered access
	Facilities	Primarily facility (vulnerability to) attacks; some references to facility location (decisions).
	Logistics	Logistics activities and decisions including routing, stock management, transport, and procurement.

however, the war originates from the strong desire of different parties to own and control resources (e.g., natural resources and economic empowerment). We could neither identify conflicts purely driven by creed and goods nor those with a purely *local* or *global* reach. Thus, we recognised the classification as encompassing a continuum ranging from conflicts clearly driven more by the fight for goods/creed-related issues on one dimension, and those with a largely local/global reach on the other dimension (Figure 1).

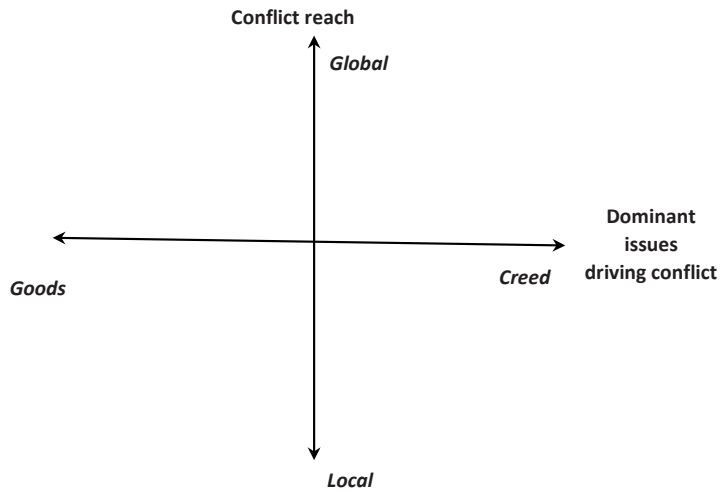


Figure 1: Types of conflict environments (or typology of conflicts)

Conflict Environments and Associated Security Challenges

The security challenges identified per conflict environment are summarised in Table 3. The small letter 'x' represents relatively lower influence of a characteristic or security challenge; a bold capital 'X' represents relatively higher influence. The only Go-GI conflict under study had certain elements that we found to be in-between. We marked those with a capital 'X'. Blank cells for a particular conflict environment reflect those characteristics or security challenges were found to be generally insignificant.

Primary Research – Semi-structured Interviews

Having established the key themes, developed a typology of conflict environments and determined the key characteristics and typical security challenges each of the environments posed, we could address our research questions as outlined in the introduction of this chapter.

Data Collection

The primary source of data were practitioner interviews. We developed interview protocols to conduct in-depth semi-structured interviews. We sought participants in various ways including through conferences, networking, and snowballing. In total, we conducted 24 interviews with 10 participants (Table 4). We aimed for representation of all conflict environments within the studied IHOs but this was not achieved within

Table 3: Conflict Environments, characteristics and typical security challenges

	Conflict Environments			
	Goods-dominated/ Local (Go-L)	Creed-dominated/ Local (C-L)	Goods-dominated/ Global (Go-G)	Creed-dominated/ Global (C-G)
Nondiscretionary Environmental Factors: Key Characteristics				
Lack of government control	X	x		
Multiple warring parties	x		x	x
Breakdown in chain of command (within armed groups)	X	x		x
Long chain of command (armed groups)				x
Radicalisation			X	X
Overall complexity	x	x	X	X
Overall dynamism	X	x	x	X
Main Security challenges: Attack Context (AC), Frequency (F), Weapons used (W)				
Transit (AC)	x	x	x	X
Facility (AC)	x	x	x	X
Criminal (AC)	X	x	X	x
Targeted attack (AC)			x	X
Sophisticated weaponry (W)			x	X
High frequency (F)	X	X	x	
Overall frequency of attacks	X	X	X	x
Overall severity of security incidents	x	x	X	X

the data collection window (Table 4). There are plans to conduct further interviews in the future to enhance validity of findings. The interviews covered all the emerging themes (Tables 2 and 3) and sought to establish more explicit links with performance outcomes from an OM viewpoint. We also used the interviews as an opportunity to establish if trends on insecurity and humanitarian concerns emerging from the IHO reports reflected practitioner experiences, to validate the conflict typology dimensions and our categorisation of the conflicts, and refined them accordingly.

Analysis

The interviews were transcribed followed by a qualitative content analysis (Miles and Huberman, 1994; Schreier, 2014). To enhance validity, I performed the initial analysis (first order analysis) within cases to identify unique case patterns (Voss et al., 2002). The initial analysis was checked by, and discussed with, another researcher before being finalised. I also deductively coded for the themes identified during the quantitative content analysis and the rest of the OM-related issues (sourcing strategy) as set out in the research questions but not part of the discourse in the annual reports.

Table 4: List of interviewees and conflict environments covered per IHO

IHO	Respondent ID and role	Number of interviews & mean duration <i>per respondent</i> Conflict environments & countries
Organisation A	R8 – Head of Logistics R9 – Operations, top management	Total 4; mean 54 minutes 2: Go-L (South Sudan), C-GI (Syria) 2: C-L (Chad), C-GI (Yemen) Go-GI conflict environments not covered
Organisation B	R10 – Security Expert R11 – Logistics Advisor R12 – Operations, top management R13 – Logistics Advisor	Total 13; mean 101 minutes 4: Go-L (South Sudan), C-L (CAR), Go-GI (Somalia), C-GI (Syria, Yemen) 3: C-L (Myanmar), Go-GI (Somalia), C-GI (Syria) 4: Go-L (DRC, South Sudan), C-L (Myanmar), Go-GI (Somalia), C-GI (Afghanistan, Syria, Yemen) 2: C-L (CAR, Myanmar), C-GI (Afghanistan, Iraq, Pakistan, Syria)
Organisation C	R14 – Security Expert R15 – Logistics and Supply	Total 4; mean 65 minutes Go-L (South Sudan), Go-GI (Somalia) Go-GI (Somalia), C-GI (Iraq) C-L conflict environments not covered
Organisation D	R16 – Humanitarian Affairs, top management R17 – Humanitarian Affairs, top management	Total 3; mean 44 minutes 2: Go-L (South Sudan), Go-GI (Somalia) 1: C-GI (Syria) References to C-L but more data required

There were also emerging themes that were coded for. For example, it emerged that some IHO modus operandi elements are intended to enable direct response to the environment. We found Organisation A, Organisation B, and Organisation C support host governments as needed. However, Organisation A and Organisation B invest in healthcare facilities and systems with the intent to improve the quality of services provided while Organisation C invest in the policing function in order to improve the security situation. We coded only for those responses that are intended to improve the security situation. After that, we conducted a second-order analysis within the cases to establish linkage patterns between HA- and OM-related issues.

We proceeded to conduct a cross-case analysis having obtained the depth of knowledge that is required through the within-case analyses (Voss et al., 2002). We systematically searched for patterns, looking beyond initial impressions and reviewing the within-case analysis results through multiple lenses (Eisenhardt, 1989b; Miles and

Huberman; 1994). This was most beneficial for understanding sector-level implications of individual IHOs approaches to coping with insecurity within conflict environments. More generally, given the highly exploratory nature of our research, these approaches mitigated the risk of overstating the significance of findings and led to better-grounded findings and enhanced generalisability of results (Eisenhardt, 1989b; Voss et al., 2002).

4.4 Results

Within-case Analyses

In this section, we present key findings on how IHOs deal with insecurity as part of their modus operandi in different conflict environments. Furthermore, we consider the implications of their approaches for IHO identities vis-à-vis the humanitarian principles as this is crucial in HA. Each IHO's modus operandi, as informed by its OS, and the operational implications across conflict environments are tabulated in Appendix IV.

Organisation A

The results reflect findings for Go-L, C-L, and C-GI conflict environments; the Go-GI environment was not covered during the interviews.

Dealing with insecurity – modus operandi

Organisation A mainly employs *mainstream strategies* for dealing with insecurity. They primarily seek to gain acceptance by demonstrating their neutrality through engaging with all warring parties and having a no weapons policy. This has largely been successful in local conflict environments (Go-L and C-L). The organisation has avoided remote management while fulfilling its mandate by maintaining long-standing relationships with national societies. They ensure that national societies uphold the same humanitarian principles as Organisation A and help them to build their capabilities and response capacity. Organisation A also strives to ensure that national societies are equal partners who contribute substantially to the relationship. For example, their vast presence (“in every country and village” (R8)) and unparalleled contextual knowledge are highly sought after. Other IHOs increasingly contract them as an implementing partner to improve their access and operational capacity.

Engaging with all parties to the conflict has allowed Organisation A to avoid the exorbitant costs of using armed escorts and armoured vehicles in highly insecure

conflict environments. However, this approach works where there is a limited number of warring parties. In Chad (C-L conflict environment), for example, there are two main parties to the conflict and Organisation A has established a good working relationship with the leaders of the armed groups over time. In contrast, when there is constant “metamorphosis of existing actors, new ones emerging, others disappearing” (R9), e.g., in C-GI conflict environments, this approach is ineffective. Operational costs and delivery performance are negatively impacted.

“Yemen is very complex. You have 200 parties, basically, to this conflict and coalitions are not so clear-cut.... If one car needs to move from point A to point B, you have to talk to all these people (...)! So, crossing frontlines means that at every single checkpoint you have to talk to the commanders, to the high political leadership, then the small commander, then smaller smaller (sic) commander until you [complete] the trip.” (R9)

Seeking security guarantees in advance of a movement has also generally led to fewer security incidents but that approach is less effective in G-L and C-GI conflict environments. This can happen for different reasons, e.g., broken chain of command or an unexpected new actor (Appendix IV, Table A4).

Variations to the modus operandi

To improve operational outcomes, Organisation A has some variations of the modus operandi but it does not compromise any of its core values (Appendix IV, Table A4).

The main responses to a lack of access are profiling of staff to mitigate security risks and/ or outsourcing to other parties. For example, in South Sudan, individuals from certain tribes are no longer sent to areas where they are not welcome. If profiling does not work, Organisation A forges *networks/ partnerships* (with parties other than the national societies) and outsources last mile delivery to them. As these parties are treated like equal partners, from Organisation A’s perspective, this approach enables them to avoid the adoption of remote management as a security strategy. However, this creates a new challenge. Organisation A cannot implement its standardised last-mile reporting (often IT-enabled) of logistics activities because the partner organisations often have different reporting capacities and standards. Organisation A tries to mitigate the effects of these differences (e.g., partial loss of accountability and aid distribution information) by improving transparency and traceability through

other approaches. For example, their partners must document distribution activities using GPS cameras and representatives from recipient populations confirm that they received the right quality and quantity of supplies. These efforts are deemed acceptable to donors who have not withheld funding whenever Organisation A outsource last mile delivery.

Other responses have barely improved outcomes, especially in C-GI conflict environments that emerged as part of the Arab Spring. One aspect of Organisation A's MO: getting host government permission to operate, has been time-consuming despite efforts to exert pressure on those governments through influential parties within Organisation A's *networks/ partnerships* (Appendix IV, Table A4). When permission is eventually granted, this can still be under conditions that compromise Organisation A's perceived neutrality. For example, in Syria, it took months to obtain permission to work in the country but this was granted only in government-controlled areas. Even then, heightened security threats limited the access of Organisation A and the national society and they could not find good partner organisations. They eventually looked for multiple third parties to deliver goods and services leading to the lengthening of the supply chain as well as higher operating costs.

"(...) with the access limitations that we were also facing, we had to rely on (the national society). But they also sometimes had their own short-comings, and had to rely on their own local connections, basically. And that meant also delays and more expenditures because that comes at a fee. So, the whole chain is affected, obviously because of that close link between logistics and security." (R9)

Organisation A has not addressed certain inherent weaknesses despite the negative impact they have on operations (Appendix IV, Table A4). For example, engaging with all armed groups in C-GI conflict environments is highly inefficient but remains the primary way of seeking acceptance. To a large extent, this is because most of Organisation A's identity-driven modus operandi elements are embedded in their mandate and there is little room for variation. The need to engage with all parties to the conflict is a prime example.

Organisation B

The results reflect findings for all four conflict environments.

Dealing with insecurity – modus operandi

Organisation B uses the *mainstream strategies* for dealing with insecurity and predominantly relies on acceptance. They also believe that their focus on short-term goals facilitates this.

“(...) I think that the short-term is what drives us and what makes us also accepted, and it has also an impact on how we've been perceived. "Oh, yes, these guys are here. The medics with money, let them do things, what they want. They don't harm us, they're a bit naive, they don't think about the future.” (...) The single mandate that we have, independence, our own money, allows us to do things that [others] can't.” (R13)

Organisation B's approaches of negotiated access and improving security through acceptance have been most difficult to implement in C-GI conflict environments. Organisation B's “capacity to move across frontlines” (R12) is highly limited. They tend to work on one side of the conflict. The dynamic nature of the conflicts and long chains of command also hampered efforts to negotiate access with the armed group leaders on an on-going basis. In Syria, for example, they experience a rise in security incidents despite having security guarantees. As armed groups evolve or new ones emerge and old ones disappear, Organisation B loses any leverage that comes from a long-standing relationship with armed groups and the value they attach to Organisation B's work.

In general, Organisation B limits the exposure of international staff in C-GI and Go-GI conflict environments where the risk of attack is highest. For instance, in 2017, around 20 international staff were deployed in Yemen (C-GI conflict environments) but up to 500 were in CAR and South Sudan (C-L and Go-L conflict environments, respectively).

Variations to the modus operandi

Organisation B's variations to its modus operandi reflect its pragmatic views on identity.

“[On Organisation B's values] It's a—what's the word? A gliding scale? I think everything starts from identity, principle, beliefs, values or character or mantras. Now, we have quite a few of those things. Then you balance that with the (...) needs and then you see how much you can compromise.” (R13)

A major recent change is that Organisation B has shifted from establishing red lines that they should not cross in their efforts to serve civilians to a “red dots” (R10, R13) logic. Specifically, they have identified 13 compromises on their modus operandi and, by extension, identity which they can make on a situational basis across all conflict environments. Three key conditions for those compromises are that (i) Organisation B would otherwise not be able to assist civilians, (ii) they must be temporary and (iii) at a reasonable cost. Costly measures like the use of armoured vehicles are not preferred. Some examples of the compromises by Organisation B pertain to how they define access, the use of armed protection, and the no-weapons policy (Appendix IV, Table A5). In addition, Organisation B is adamant that it sees working through others as a temporary tactical approach. They neither act as a donor to other organisations nor invest in their capacity building.

Organisation B upholds certain modus operandi elements only when they make a difference for operational outcomes. For example, they often only engage with stakeholders when it improves their safe access - mostly governments and parties to the conflict. Organisation B also does not seek to have the same relationship with these parties, but seeks to establish the most appropriate relationship type given the level and type of influence each actor (potentially) has. This strategy has mostly failed in C-GI conflict environments where it is not always possible to establish any meaningful dialogue with armed groups and governments alike. Consequently, it has been impossible to successfully negotiate access with influential actors.

To address the access challenges in C-GI conflict environments, Organisation B has compromised through altering its resource base and/ or sourcing strategy. Most of these changes were triggered by the need to rapidly establish “some medical relevance” (R10) in Syria where, for instance, they used telemedicine alongside remotely supporting individuals/ organisations and outsourced healthcare service provision to a Turkish organisation. This contrasts their modus operandi of directly providing medical care through “international staff who are *clearly not connected to the conflict* (italicised for emphasis)” (R12).

“Again, ultimately, do you measure the success of your operations in objective yardsticks or in the extent in which you feel good about yourself looking in the mirror of your identity? (...) I wish I could have done a lot more in Syria, but I accept I can't (...).” (R12)

When Organisation B remotely supports other entities, it loses control over operational decisions. They try to create “a lot of goodwill” (R11) and negotiate to obtain reports from the organisations/ individuals they support. This has also implied the need for third party monitoring systems which does not always enable Organisation B to ascertain if their support leads to acceptable levels of performance and adherence to the humanitarian principles. This appears to be acceptable to donors who have not withheld funding.

Another response of Organisation B to enable direct access and service provision is to profile the international staff that they deploy to all the conflict environments.

“If you then start to talk about it, then indeed you will discover that what I perceive to be a vulnerability, because I have the perspective of a male, Caucasian, from Holland, of a certain age. It's completely different than the one of a black lady from Zimbabwe. (...) That (is) what put us on the track of (staff) profiling. Something that we use very much. Some settings are gender specific. (If) it's not safe for ladies [there], we don't have ladies [there] (...).” (R10)

Organisation C

Organisation C's results reflect findings for Go-L, Go-GI and C-GI conflict environments; the C-L environment was not covered during the interviews.

Dealing with insecurity – modus operandi

Organisation C make an oversight of the humanitarian needs in a project and then work primarily through implementing partners to deliver the required goods and services. Implementing partners are also used if Organisation C's security restrictions prevent it from conducting operations that they would ideally do themselves either through direct access or remote management. This tends to be case in Go-GI and C-GI conflict environments. In those instances, partners must have safer access than Organisation C to avoid the mere transfer of risk.

When Organisation C can conduct operations better than any of its partners, their international staff manage operations and the organisation mainly employ *mainstream strategies* for dealing with insecurity. While there is an organisational affinity for acceptance, heightened security threats in Go-GI and C-GI conflict environments like targeted attacks have led Organisation C to rely more on protection and deterrence over time. Keeping a low profile (e.g., not branding vehicles to avoid

the potential of becoming a target), the use of armoured vehicles (which cost as much as US\$200,000 per unit) and armed protection (including the army and private contractors) are common approaches.

“So, the balance has changed from acceptance to deterrence and protection. And with that, there has been a shift in how the money is spent (...) In some places the security is about half of our budget for us to stay and deliver.” (R14)

Deterrence/ protection strategies still have two major limitations. First, while the safety of international staff is secured by having them live and work in fortified compounds, national staff become more exposed to the conflict. Second, host governments sometimes disallow the use of armoured vehicles which further limits movement.

Organisation C incorporates *other responses* in their modus operandi in efforts to deal with insecurity. An important part of their modus operandi is supporting governments by funding the police (e.g., building police stations, buying vehicles, providing fuel, and paying personnel salaries) (Appendix IV, Table A6). This approach is costly but directly improves the security situation which facilitates delivery performance, especially in Go-L environments where crime rates tend to be extremely high and governments often lack the resources to tackle crime (e.g., South Sudan). In Go-GI conflict environments (Somalia), however, the crimes are much more serious (e.g., kidnappings by armed groups with complex networks) and this approach is ineffective.

The mandated decision about which conflict environments to work in was found to be of no direct operational value (Appendix IV, Table A6). However, the deployment of resources once the decision is taken often enables the organisation to have good operational capacity either directly or through others.

Variations to the modus operandi

None of Organisation C's variations deviate from their mandate but the mandate can be more important than the humanitarian principles. For instance, Organisation C perceives that it will always have high security risks in Go-GI and C-GI conflict environments. However, once mandated to work in any conflict, Organisation C is given resources needed to stay and deliver. It mitigates the risks of targeted attacks by investing heavily in risk management as evidenced by the use of massive security management systems and having multiple in-house security experts. Furthermore, the

mandate to stay and deliver is deemed more crucial than even upholding humanitarian principles. In particular, Organisation C readily uses armed protection (Appendix IV, Table A6). This enables access but does not always lead to the best results operationally.

“For us to stay and deliver sometimes, that means very restricted movement. And when there is movement it is (...) completely against humanitarian principles. Some places we have to move with armed escorts from private security companies or from government forces. So, there are people with weapons in front of, or behind, our convoy as we move.” (R14)

Another response to heightened security threats for Organisation C staff has been reserving “the right profile staff” by deploying those who are least likely to be attacked to the field (e.g., based on nationality) (R14). Organisation C also outsources more implementing partners (including commercial companies like DHL) and build their capacity if they lack the necessary skills and resources (Appendix IV, Table A6). In such instances, accountability standards are often compromised. Organisation C has developed multiple tools for mitigating this ranging from asking implementing partners and/ or national staff to document evidence of operational activities using GPS tracked mobiles to the use of iris scans to track the fulfilment of needs of individuals. These tools “might not always meet the needs of Western-based audits” (R15) but are acceptable to donors. Organisation C has also made greater innovation efforts in technology-based performance measurement and accountability tools; independent third parties also track and report on the performance of different implementing partners. Despite these efforts, evaluating operational success is still a challenge.

“Well, that outcome (of outsourcing) is difficult to measure because quite often, when we increase the number of local partners is when we don’t have access ourselves (and this affects monitoring). It is very difficult to say how effective we would have been on the ground (...). So, I guess, in that sense they are more effective than we would be because we can’t be (there).” (R14)

Organisation C has not addressed certain inherent weaknesses which have negatively impacted their operations (Appendix IV, Table A6) because most of its identity-driven modus operandi elements are based on their mandate which is binding, e.g., they cannot engage with armed groups that have been labelled as terrorists by the UN and

this diminishes opportunities to gain access or improve the security situation in the terrorist-controlled areas.

When the conflicts are dynamic because the parties to the conflict are in flux, the sources of threat are also changing all the time. Organisation C struggles even more with achieving any of the performance objectives. This has predominantly been the case in C-GI conflict environments. Once Organisation C is unable to work through implementing partners or do the work themselves because of high security threats, avoidance is adopted as a last resort.

“(...) it could be (due to an) internal security evaluation, (that we say), “Okay, fine, nobody will deny us access there but- (if we go in, the risk of targeted attacks) is too high.” (R15)

Organisation D

These results reflect findings for Go-L, Go-GI, and C-GI conflict environments; the C-L environment was not covered during the interviews.

Dealing with insecurity modus operandi

Organisation D mostly employs *mainstream strategies* to directly deal with insecurity. Acceptance is the most preferred approach and leads to clear cost, quality, and delivery performance benefits in Go-L conflict environments. Organisation D has been successful at reconciling conflicting parties or religious leaders (Appendix IV, Table A7) and is frequently appointed as lead in *networks/ partnerships* formed by IHOs in Go-GI and Go-L conflict environments as a result.

Organisation D needs a certain level of stability (in terms of security incidents) to achieve its operational goals because of its background as a development organisation. Unfortunately, instability is “increasing exponentially as the reach of the governments are decreasing” (R16). In South Sudan (Go-L conflict), for example, instability has forced Organisation D to conduct 20 – 40% of operational activities remotely at any given time. Organisation D increasingly and reluctantly leans towards remote management - whether they insource or outsource operational activities. In conflicts where its religious identity is rejected (predominantly Go-GI and C-GI environments), 50% - 100% of operational volume is remotely managed. Remote management negatively impacts performance measurement capabilities.

Two of Organisation D's value-based *modus operandi* elements were found to be of no direct operational value namely, the reservation of senior roles for Christian individuals and a democratic process involving the majority of Organisation D's members in making decisions affecting its identity. These elements have, however, negatively impacted operations in terms of quality of decisions in countries where Christianity is a minority religion as well as flexibility and responsiveness when its members have divided opinions on a major issue.

Variations to the modus operandi

When the mainstream security strategies fail, Organisation D alters some of its OS elements and engages in *other responses*. In terms of OS, Organisation D formed *partnerships* by outsourcing goods and services provision to local organisations in Syria (C-GI conflict) in efforts to tap into their capabilities to address access challenges. Two major concerns with this decision are that Organisation D was forced to also contract fledgling organisations because of limited recruitment options and could not reliably establish performance outcomes. These concerns have negatively impacted Organisation D's fundraising for C-GI conflicts because it does not meet essential donors' accountability criteria. Other adaptation measures are a significant departure from Organisation D's *modus operandi* but neither compromise its values nor significantly improves operational outcomes. For example, the multi-country operations only work if both sides of a border are open. Furthermore, airdrops and in-and-out missions lead to more continuity in delivery but lead to high transport costs while humanitarian concerns like equity cannot be reliably measured.

In terms of *other responses*, negotiation with warring parties and advocacy on behalf of the beneficiaries is the main approach employed in all conflict environments where Organisation D already operates. It can, however, take years to get the desired outcomes. This approach often improves operations in the long run. As a major player by operational volume in the humanitarian sector, Organisation D still endures this process to avoid eventually pulling out and leaving a vacuum whereby no other humanitarian actor is available to (continue to) address beneficiary needs.

Organisation D has shown some flexibility by deviating from some of its values. Internally, Organisation D conceals its religious identity in conflicts where it is rejected in order to improve acceptance. Respondents felt that this adaptation measure is

effective, even when warring parties still know its identity. Externally, Organisation D occasionally violates its neutrality and no weapons principles by seeking protection from UN peacekeeping forces. However, on grounds of the same principles, they do not establish partnerships with the peacekeeping forces even though they acknowledge that they have capabilities that could benefit them as an organisation.

“... (In South Sudan) we are still operating in the same environment (i.e., with the UN peacekeeping forces) but we are not integrated and for many reasons. Number one is neutrality, (...). So, it is this difficult thing where we look to them for safety but we cannot look to them for collaboration.” (R16)

Cross-case Analysis

An emerging pattern from comparing findings across cases was that IHOs also directly interact with the environment, in line with their identities, with the purpose of seeking to improve operating conditions. Specifically, they persistently attempt to influence conditions that enhance hostility, e.g., the behaviour of parties to the conflict and high local crime rates. Subsequently, IHOs' adapted sourcing and security strategies compensate for the lack of success vis-à-vis these attempts. Thus, the direct interaction with the environment by seeking to influence it is the first attempt to deal with the hostility of conflict environments and precedes the adaptation of sourcing and security strategies. We synthesise the within-case analysis results presenting them in this order.

Influencing the Environment

Table 5 summarises the key findings across the four case IHOs regarding the modus operandi elements that constitute approaches that attempt to ***influence the environment***. We identify three main approaches which we label as *reform*, i.e., attempting to bring about long-lasting change by influencing factors that affect the humanitarian space (e.g., increasing awareness about international humanitarian law to armed groups in hopes that this alters their behaviour towards civilians and humanitarian actors); *revamp*, i.e., attempting to improve other factors that impact the security situation in the short-medium term (e.g., financially supporting the policing function to reduce crime-related incidents such as armed robbery); and/ or *react* (i.e., initiating a response only when such factors severely impact operations like publicly speaking out against the actions of a particular government or armed group). Most IHOs have duality of purpose but predominantly focus on a specific approach.

Table 5: Modus Operandi Elements Related to Influencing the Environment

MODUS OPERANDI AND GENERAL PROFILE				
MODUS OPERANDI	ORGANISATION			
	Organisation A	Organisation B	Organisation C	Organisation D
Value-based				
Support host governments as needed				
Engage with host governments				
Engage with warring parties (often on an ongoing basis)				
Work with local and international personnel				
Strive for proximity to beneficiaries				
Incorporating religious identity; proselytising in operations				
Local managers must share Organisation D's religious identity				
Other				
Long planning cycle at project level				
Short planning cycle at project level				
Investment in security management				
Always obtain security guarantees for planned movements				
GENERAL PROFILE				
General purpose	Dual purpose Invests most in reform to improve the observance of international humanitarian law by all warring parties while reacting to non-discretionary factors.	Singular purpose Invests most in reacting to the environmental conditions.	Dual purpose Invests in revamping security-facing systems (primarily the policing function) and deterrence strategies as a reaction to non-discretionary factors.	Dual purpose Invests in reform largely at the civil society level.
Key Focus	Focus on humanitarian space	Focus on overcoming non-discretionary factors	Focus on improving immediate security situation	Focus on reforming civil society

LEGEND:  Reform  Revamp  React

Organisation A and Organisation D primarily focus on reform. Organisation C mainly pursues revamp-oriented approaches. Organisation B primarily focuses on reacting to the environment only responding to such factors when they have a direct bearing on its operations. Overall, reform and revamp approaches seek to influence the environment through bringing about systemic change and reinforcing existing functions respectively while the reactive approach seeks to address specific issues quickly and as needed.

We further find that IHOs use these approaches differently. For example, while Organisation A seeks reform that improves the humanitarian space primarily through advocating for respect of international and human rights laws among warring parties, Organisation D focuses more on the grassroots and seeks to reform civil society. This approach of Organisation A can also be viewed as a form of deterrence security strategy as there can be consequences for offenders if they are tried in their countries or the International Criminal Court.

Sourcing and Security Strategies

Table 6 summarises the IHO strategies and OM objectives/ outcomes across the four conflict environments. The OM objectives/ outcomes have been modified in line with the within-case analysis results and this will be explained shortly. In general, Organisation A and Organisation C adopt the most flexible sourcing strategies and predominantly outsource to various (I)HOs depending on the situation. Interestingly, they are also both mandated IHOs with responsibilities that go beyond mere provision of humanitarian assistance. Organisation B and Organisation D predominantly insource but Organisation B employs more tactics to gain access and achieve continuity while Organisation D switches to outsourcing in extreme situations where they cannot gain direct access. In terms of **OS and identity**, most of the studied IHOs can adopt their classical modus operandi approaches in Go-L and C-L conflict environments (denoted with an “N” to show that no adaptation has taken place). However, they have all adapted them in Go-GI and C-GI environments either somewhat or substantially (denoted with a “y” and “Y” respectively). When insourcing is adopted, the **security strategies** adopted vary; acceptance is the most common but is less dominant in globally-oriented conflicts. Overall, IHOs show different levels of success in achieving OM objectives within and across conflict environments.

Table 6: Summary table: IHOs across conflict environments

	Adaptation of Operations Strategy and Identity?				Security strategies (when insourcing is used)						Operations Management Objectives/ Outcomes				
	Resource Base?	Sourcing Strategy	Internal values?	Hum. Principles?	Acceptance	Deterrence	Protection	Remote Mgt.	Remote Support	Avoidance	Cost	Quality	Continuity	Coverage	Speed
Goods dominated/ Local															
Org A	N	N	N	N	X	X	x				+	+	-	+	+
Org B	y	N	N	N	X		x				+	+	-	~	+
Org C	N	N	N	Y	x	x	x				+	+	~	~	~
Org D	N	N	N	y	X		x				~	+	~	~	~
Creed-dominated/ Local															
Org A	y	N	N	N	X	X	x				~	+	~	+	+
Org B	y	N	N	N	X	x	x				~	+	~	~	+
Org C															
Org D															
Goods-dominated/ Global															
Org A															
Org B	Y	N	Y	Y	x	x	x	X		x	-	~	~	-	~
Org C	y	N	N	Y	x	x	X	x			-	~	~	-	-
Org D	Y	y	Y	y	x		x	X	x		~	?	+	+	~
Creed-dominated/ Global															
Org A	N	y	N	Y	x	X	x		x	x	+	?	~	~	-
Org B	Y	Y	Y	Y	x		x	x	X	x	+	?	~	~	+
Org C	N	N	N	Y			X	X	x	x	-	~	~	+	~
Org D	N	y	Y	N			x	X	x	x	~	?	?	~	-
Outcomes:					+ positive			- negative			~ mixed		? not known		
All:	CAPITAL LETTERS denote dominance/ major change														

In terms of **OS**, when IHOs deviate from their modus operandi, this is typically through altering their resource base and/ or changing their sourcing strategy. Particularly for conflict environments, they all alter their resource base by carefully selecting their personnel (local and/ or international) according to sources of tension (e.g., nationality of international personnel and religion or ethnicity of national personnel). The purpose is, at the very least, to reduce politically motivated targeted aid worker attacks. We label this alteration as *staff profiling* (a term also used by some IHOs) and consider it to be a protection security strategy. In terms of sourcing strategy, while IHOs may shift between insourcing (with or without remote management) and outsourcing, an emergent strategy we found is the shift towards offering support to local HOs operating in places that they cannot access either as a

result of avoidance or because they are barred from operating there. This has been predominantly the case in C-GI conflicts that started or intensified at the back of the Arab Spring. We label this as the *peripheral facilitator* strategy. In this arrangement, the IHO neither outsources nor insources service provision. Therefore, the IHO cannot influence the decision-making of the HO but merely facilitates its service provision, e.g., by providing scarce supplies and expertise.

The main difference among outsourcing IHOs is in how they view and work with implementing HOs. Some view them as equals (Organisation A and Organisation C) or as having the potential to operate significantly better than they could (Organisation C and Organisation D). These IHOs invest in supporting implementing partners and even building their response capabilities but different IHOs emphasise accountability in reporting differently. Organisation A was the most liberal IHO in this respect while Organisation C is stricter and has the technologies to do so. Organisation D on the other hand, sometimes struggles to reach the monitoring standards that are expected by donors and this compromises their funding position.

There can also be adaptations made with respect to **values** (Table 6) which have an impact on security strategies. For example, most IHOs reported using armed protection, a deterrence strategy in violation of humanitarian principles, as a last resort in Somalia. Organisation D also desists from proselytising, i.e., trying to convert locals to their religion, to improve its acceptance. This appears to have paid off. Organisation D appears to engage more meaningfully with community leaders (who are often religious) and fares better on acceptance than all the other studied IHOs. This is partially evidenced by securing the largest contracts from the UN cluster for working in Somalia where religion plays an important role in society. That said, Organisation D still has its limits and struggles to cope in contexts with radicalised armed actors.

We identify six **security strategies** (Table 6). In addition to the five mainstream ones identified in the literature (Table 2), we identified an emergent additional strategy which we labelled as *remote support*. Unlike with remote management where the IHO is still the owner of the operation, under the remote support strategy the IHO has no ownership of, or control over, the operations that they support. Remote support

is coupled with the peripheral facilitator strategy. In general, remote approaches are extensively used in globally oriented conflicts.

For **OM concerns**, traditional OM *performance objectives* of quality, speed, and cost remain relevant – albeit with some differences in emphasis (e.g., cost does not always seem to be an important consideration and is more easily sacrificed). *Continuity* replaces reliability because no single actor can guarantee that they will deliver as intended. However, some IHOs do better than others in ensuring that periods of disruption are brief and fewer. This is primarily the case if outsourcing or investment in deterrence strategies are adopted. Furthermore, *coverage* is a more relevant objective than flexibility (e.g., in volume and product/ service). Although the latter is often needed, it is difficult to pursue. All IHOs appear to simplify their operations as security challenges worsen but they consistently strive to reach as many people as possible. Any form of assistance that can sustain life, however inadequate for improving the quality of life, is deemed better than none at all.

Extending the OM performance objectives to **operational outcomes**, a major issue to be noted is that in all situations, it is difficult to appropriately measure performance. Monitoring, accountability, and transparency challenges limit the ability of IHOs to measure outcomes precisely in both outsourcing and insourcing situations. Despite these challenges, results show that in locally-oriented conflicts, insourcing IHOs achieve better quality and speed while outsourcing IHOs achieve better continuity and coverage. It is difficult to say if one approach is cheaper than the other as there are different cost implications. For example, insourcing IHOs incur higher personnel safety and transport costs while outsourcing IHOs incur higher monitoring costs. In globally-oriented conflicts, security challenges highly limit insourcing IHOs. If they can operate, they can offer good quality services but they are not necessarily better than outsourcing IHOs. For example, some respondents noted that the service quality of local HOs in Syria was often superior to theirs. Therefore, from an OM perspective, insourcing becomes highly inefficient in globally-oriented conflicts.

4.5 Discussion

In this section we focus on the key results of our study and develop propositions for validation in future research. We also discuss implications of our results for research and practice.

Our research sought to establish how, and for what purpose, individual IHOs' MOs inform their coping strategies in different conflict environments and the operational implications thereof. A crucial finding from our research is that certain *modus operandi* elements serve the purpose of trying to influence the environment with the purpose of improving operating conditions. We identify three approaches to trying to influence the environment: IHOs seek to alter the environment through *reform* and *revamp* efforts and/or merely *react* to it when the level of hostility is such that they can hardly operate at all. Reactive approaches are most prominent in more globally-oriented conflicts where we find nondiscretionary factors (Liu et al., 2018) to be dominant. IHOs can neither alter nor influence most factors. Subsequently, regardless of the extent to which they try to influence the environment, IHOs are forced to find ways of adapting their sourcing and security strategies. They all adapt their strategies (sourcing and security) according to the prevailing challenges faced in each conflict environment to improve outcomes. In general, most IHOs apply their preferred strategies (based on their classic MOs) in locally-oriented conflicts but significantly adapt as conflicts become more globally-oriented. We also find that different sourcing strategies lead to different trade-offs within and across conflict environments. Consequently, they carry different performance implications. This implies that, in terms of overall operational success, there is no single best strategy for any given conflict environment. On this basis, we find support for our assertion that the humanitarian ambition to meet needs wherever they may exist is a sector-wide endeavour as opposed to an individual IHO mission. Even then, there are clear limits to international humanitarian assistance and we discuss this in greater detail in later sections.

Regarding HA concerns, our study confirms the important relationship between IHO identity and responding to security challenges. We find that IHOs can prioritise values that, at best, have no effect on humanitarian and OM outcomes. For example, the need for Christian top management within Organisation D does not appear to improve operational outcomes and leads to inefficiencies in contexts where it is difficult to find Christian recruits. We doubt that this is an indication of irrational behaviour. Rather, it could reflect the multifaceted nature of the challenges they face leading to suboptimal outcomes (e.g., for Organisation D this may be one of the ways to ensure continued donor support) and brings to fore the need for more interdisciplinary

research in the field. That said, our results still lend support to those HA scholars who call for principled HA to mitigate access challenges (e.g., Donini et al., 2006; Menkhaus, 2010). Our findings further show that an IHO's values influence the nature and breadth of options at its disposal when trying to cope in different conflict environments. This has major implications for, among others, how quickly an IHO can typically gain access and for how long it can sustain it.

Propositions

Our overall findings show that the IHO identity, first and foremost, determines how IHOs respond to the environment. Successful attempts to influence the environment can benefit other IHOs in the same environment leading to improved- albeit less than ideal, environmental conditions to contend with. The identity still influences how IHOs then cope with these effects through their sourcing and security strategies leading to varied trade-offs and outcomes within and across environments. These findings lead to a proposed framework linking IHO identities to modus operandi elements pertaining to efforts to directly influence the environment and strategies (sourcing and security decisions) adopted in different conflict environments (Figure 2). Our propositions focus on (i) how efforts to influence the environment impact the operating conditions in different conflict environments; (ii) the relationship between sourcing (and security) strategies and trade-offs in different conflict environments; and (iii) the overall implications of (i) and (ii) for realised OM outcomes. We conceive of interaction with the environment in efforts to influence it as preceding strategies for operating in different conflict environments. Accordingly, our proposed model is constructed as such. We provide more context on the depictions in Figure 2 as we develop related propositions.

IHO Identity and Directly Influencing the Environment

Our results show that three IHOs (Organisation A, Organisation C, and Organisation D) have duality of purpose when trying to influence the environment while only Organisation B has a single focus. While for Organisation A and Organisation C this appears to be related to their mandated status, we think that in the case of Organisation D this is because of its roots in the development sector which, unlike HA, explicitly emphasises long-term transformation of systems. All IHOs seek to *react* to the environment in some way, i.e., they seek to influence it reactively rather than proactively in response to factors that have a direct and profound impact on

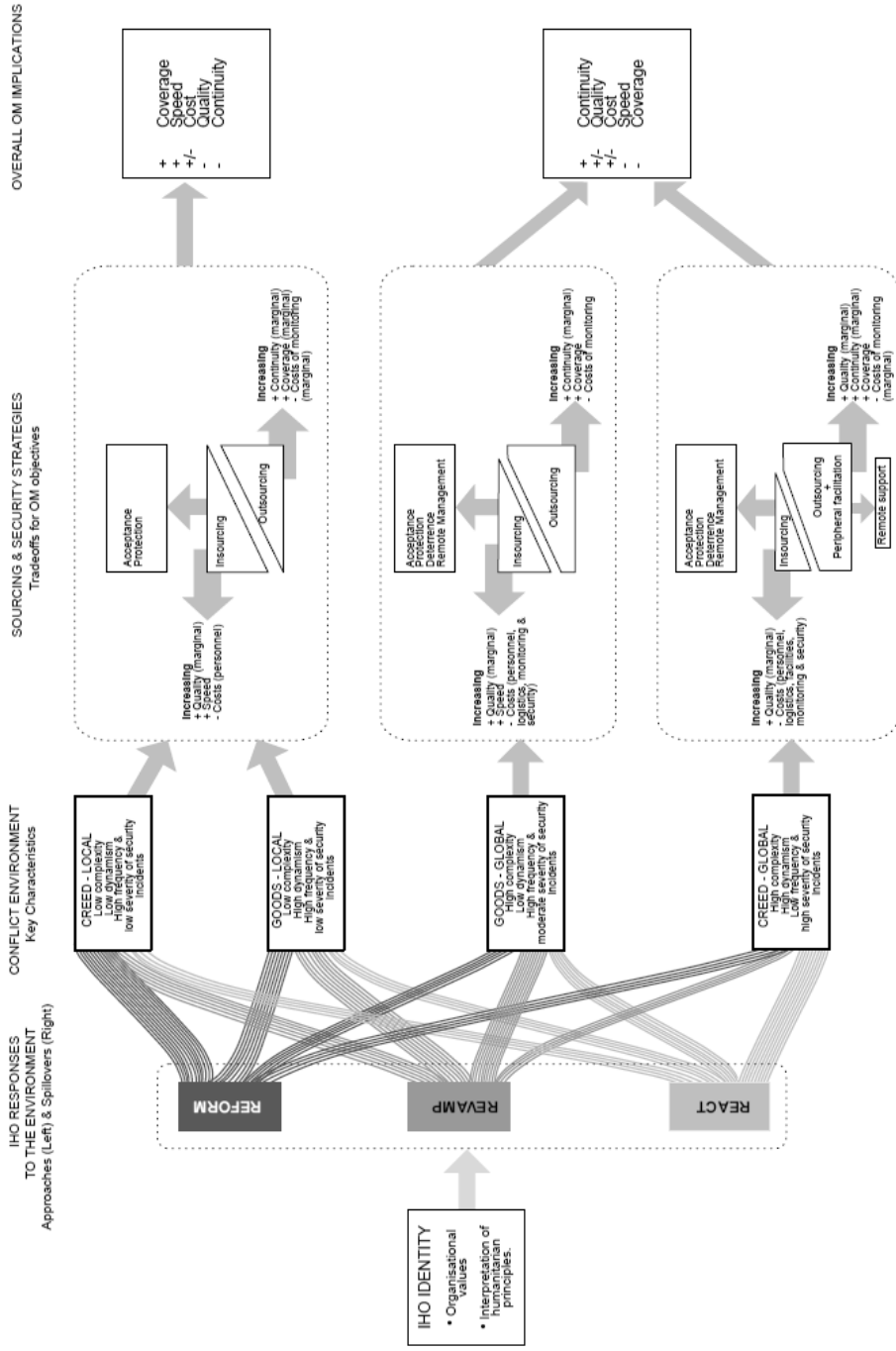


Figure 2: Proposed framework on key relationships and outcomes

operations. Organisation B predominantly and consistently adopts this reactive approach. This is not surprising given the IHO's origins and belief that humanitarian assistance should be swift and independent. The other case IHOs further seek to *reform* or *revamp* the environment which can improve overall operating conditions. When the environmental conditions are improved through reform (e.g., improving general respect for humanitarian actors) or revamp (e.g., increasing the effectiveness of the policing function) approaches, this benefits the overall sector. Thus, successful efforts to influence the environment lead to positive "spillovers" (Thornton and Thompson, 2001) that benefit the overall sector.

Go-L and C-L environments are less complex which makes it likely easier to reduce hostility, especially as the host governments tend to be non-restrictive and there is a high level of dependency on IHOs to, for example, secure legitimacy (Dube et al., 2016; Mcloughlin, 2011). The compulsion to adopt more remote and outsourcing strategies in more globally-oriented conflicts may reflect the difficulty of improving environmental conditions implying that non-discretionary factors dominate. Reform and revamp efforts are less effective, especially in the short term as evidenced by the struggles IHOs faced from new Arab Spring-triggered conflicts. This compels IHOs to predominantly *react* to these factors. Successful new means of navigating the heightened hostility can be mimicked and refined by other IHOs. Single purpose IHOs that focus on quick reaction seek quick solutions to changing conditions and may take high risks in efforts to improve operating conditions and, by extension, achieve better operational outcomes. IHOs with duality of purpose, especially mandated ones, are least likely engage in risky reactive approaches because that could compromise their negotiation positions vis-à-vis reform and revamp efforts. Nonetheless, dual purpose IHOs appear to learn from, and build on, the successes and failures of single purpose IHOs (Amankwah-Amoah, 2011) either copying or modifying their tactics to align them with their specific constraints. For example, IHOs that find publicly speaking out risky might privately seek the support of influential governments.

A pertinent question arising from one of our key findings is why IHOs can adopt any sourcing strategy in Go-L and C-L conflict environments but are all compelled to move more towards outsourcing and remote strategies in global ones. Although there are environment specific differences, e.g., in terms of complexity, we argue that how IHO identities inform their approaches to seeking to influence the environment leads to

external spillovers that, when effective, benefit all IHOs through improved operating conditions (Figure 2). In general, different approaches to seeking to influence the environment lead to different spillovers with sector-wide benefits (Figure 2). Though being a long-term goal with no guarantees, if successful, reform benefits all IHOs through improving conditions that affect the humanitarian space. Revamp efforts benefit all IHOs through addressing other factors that affect the security situation in the short-medium term. Reactive approaches to emerging nondiscretionary environmental factors benefit all IHOs through enabling them to observe, evaluate, and modify their own reactive approaches in line with their constraints. There are, however, major contingency aspects to be considered. For example, reform is more effective in less complex environments but can be dampened by high dynamism in those environments. Revamping works best where warring parties do not use advanced weaponry.

Propositions on spillover effects from directly influencing the environment

These arguments lead us to our first set of propositions on spillover effects arising from IHO approaches to responding to the environment in conflict settings.

Proposition 1: IHO efforts to directly influence the environment inherently lead to spillovers that in (directly) benefit the sector directly across conflict environments.

Proposition 1a. Successful *reform* and *revamp* efforts are positively associated with spillovers that improve operating conditions for all IHOs. The sector-level benefits derived from reform/revamp efforts increases as environmental complexity and dynamism decrease.

Proposition 1b. Successful efforts to *react* to the environment are positively associated with spillovers that improve coping with hostility through mimicking or adapting such efforts. The sector-level benefits derived from reactive efforts increase as environmental complexity and dynamism increase.

Sourcing Strategies, Objectives and Trade-offs

Although we find that IHOs apply different sourcing strategies across conflict environments, we cannot single out specific strategies as exemplars of best practice; different strategies imply different trade-offs depending on the challenges posed by each conflict environment (Figure 2). Given, in addition, the different IHO contributions via spillovers, we argue that a unified approach to sourcing is neither achievable nor desirable. Our results also show that when insourcing is coupled with

acceptance as the dominant security strategy, this leads to the greatest efficiencies as the least investment in security-related costs is needed. The variety of security strategies applied by an insourcing IHO increases as conflict environments become more complex. This is invariably in globally-oriented conflicts where it is argued that the rejection of the western identity of IHOs impedes aid delivery (Beerli and Weissman, 2016; Fast et al., 2013). The efficiency of insourcing diminishes leading to some OM and HA issues. For example, the use private armed protection is costly but IHOs remain restricted (OM issue) and goes against the no weapons policy of most IHOs (HA issue). Still, IHOs argue that this strategy is adopted to meet needs that would otherwise go unmet and to enable witnessing of the plight of populations that are excluded from assistance. We depict this increasing inefficiency of insourcing as the number of security strategies increases in Figure 2 by reducing the amount of space taken up by insourcing relative to outsourcing. We expound on these insights per conflict environment before presenting our propositions.

General Comparison between Insourcing and Outsourcing Strategies

Insourcing IHOs make the most adaptations in globally-oriented conflicts. For example, the practice of staff profiling, though widespread, is most rigorous in globally-oriented conflicts. Furthermore, IHOs are compelled to adopt remote strategies (even though they applied them at varying levels of intensity and success within and across conflict environments). For outsourcing IHOs, security strategies are less of a concern. The key difference among them relates to how they perceive implementing (I)HOs; this influences the level of trust and support awarded to them and, hence, the nature of the relationships they have. Organisation B work with HOs that operate significantly better than they could and, thus, focus less on performance measures and more on supporting them. Nevertheless, the preference is always to do the work themselves. So, they often settle for peripheral facilitation whereby they do not view the relationship as a partnership and do not place long-term expectations on them. Peripheral facilitation is often coupled with remote support whereby there is little expectation of accountability to, and control from, the IHO (Figure 2).

The cost implications of insourcing and outsourcing are inherently different. Insourcing IHOs mostly incur personnel safety cost which increase as conflicts become more globally-oriented. This is the case even when acceptance is the main security

strategy employed because there is a need for further protective measures (e.g., emergency evacuations) to ensure personnel safety.

Outsourcing costs decrease as conflicts become more insecure because the cost of addressing security concerns are passed on to the implementing IHOs. However, there are monitoring costs which also increase as conflicts become more globally-oriented (and this also applies for insourcing when it is coupled with remote management). Physical monitoring implies flying people in and out for short periods of time while more investment in remote monitoring technologies is required. In the most extreme cases, some donors respond by lowering the bar for accountability while others withdraw funding if certain reporting standards are not met. Therefore, there is either greater uncertainty about the level of attainment vis-à-vis OM objectives or fewer IHOs available to meet beneficiary needs.

IHOs can make operational decisions which further augment cost differences within and across conflict environments. For example, while all insourcing IHOs incur personnel safety costs, these will vary depending on accompanying security strategies and policies. A tendency to go on lockdown during periods of unrest will have different cost implications to a preference for evacuation, for instance.

Trade-offs in Locally-Oriented Conflict Environments

Insourcing and outsourcing strategies have differing implications for attainable OM objectives because of differing challenges and implications for capabilities. Insourcing IHOs can successfully couple acceptance and protection security strategies to achieve good outcomes in terms of quality and speed; outsourcing IHOs achieve better continuity and coverage outcomes. Thus, insourcing (outsourcing) IHOs trade-off continuity and coverage (quality and speed) for quality and speed (continuity and coverage). This may be caused by resource investments that need to be made to achieve quality and speed as they are often costly and decisions have to be made swiftly. Whereas IHOs have autonomy in making these decisions as needed, implementing organisations, especially local ones, are often under resourced and need to go through bureaucratic and lengthy processes to obtain approval for making costly changes. Furthermore, the difficulty of measuring performance outcomes of implementing organisations often compels outsourcing IHOs to simplify service and product offerings to minimise wastage and diversion of resources. This simplification may also

be related to the difficulty of providing assistance in general as there are substantial demands on managers who must cope with an array of environmental and product-specific demands (Greenwald and Kahn; 2005). Continuity and coverage increase with outsourcing as implementing organisations can often get to more difficult to reach areas and, when they are locals, they are likely to remain in the area during periods of unrest. Safety concerns for international staff often mean that insourcing IHOs are cautious and more likely to withdraw personnel from the field and suspend operations during periods of unrest. Although there are these recognisable differences in trade-offs, we speculate that there are marginal differences between insourcing and outsourcing in locally-oriented conflicts (Figure 2). This is because IHOs can outsource to other better-suited IHOs and all (I)HOs conducting operations are affected by insecurity in similar ways because armed groups and the population conflate the different HOs and there is indiscriminate crime/ violence.

Trade-offs in Globally Oriented Conflict Environments

Globally-oriented conflicts tend to be highly complex with environmental factors that are difficult to alter. This leads to a host of challenges for all IHOs that demand more reactive approaches but all IHOs struggle operationally regardless of their OS. IHOs experience the most devastating losses in C-GI conflict environments because of the sophistication of weapons used in attacks. An example is the airstrike on an Organisation B major trauma hospital in Kunduz in 2015. The 92-bed hospital, which had conducted 15,000 surgeries and treated more than 68,000 emergency patients over a four-year period, was obliterated and 42 people lost their lives while several others suffered life-altering injuries⁴. It took almost 2 years to resume operation in Kunduz and, even then, the services offered were more basic. The suddenness with which such events can occur leads to heavy reliance on a local resource base regardless of the sourcing strategy adopted and all IHOs severely limit the presence of international staff. Operationally, insourcing is highly inefficient but outsourcing implications are not well-understood due to the major challenges with monitoring. At best, IHOs are able to ensure better visibility of the humanitarian issues facing discriminated groups and can gather first-hand information in order to communicate about the plight of the populations more reliably.

⁴ Kunduz hospital attack. In Focus, <https://www.msf.org/kunduz-hospital-attack>, accessed on 6 July 2021.

A curious result is that, although most security incidents will be severe (e.g., due to the use of sophisticated weaponry), they generally happen at a lower frequency. All IHOs reported that when access is obtained, there are lower risks of loss of continuity compared to locally-oriented conflicts. This suggests that despite the rejection of the IHO western identity, security guarantees are generally honoured.

Go-GI and C-GI conflict environments also have different characteristics which lead to differing decision and trade-offs between them (Figure 2). The sampled Go-GI conflict is characterised by low dynamism but higher frequency of attacks compared to C-GI conflicts. Some respondents explained the former as being the result of the homogeneity of the people of Somalia in terms of ethnicity, language, and religious affiliation. However, the goods-dominated nature of the conflict leads to higher frequency of attacks and the radicalisation of armed groups also fuels the severity of security incidents. Outsourcing to local organisations is undesirable because of “fiduciary risk”, i.e., the risk that funds are misappropriated and/ or cannot be properly accounted for (Stoddard et al., 2017). These shortcomings of either sourcing strategy have led to greater reliance on remote management of local staff by insourcing IHOs. While it does not eliminate fiduciary risk, it ensures better control over HA and OM concerns. For C-GI conflict environments, outsourcing options appear to be more viable as fiduciary risk is less of a concern and there are often capable local HOs. However, host governments are also typically uncompromising (Dube et al., 2016). Insourcing remains highly inefficient while outsourcing largely leads to marginal gains (Figure 2). Therefore, even though IHOs often rely on flexible sourcing strategies this does not significantly improve outcomes. Respondents believed the latter to be the case even when there were well-established national societies that different IHOs outsource to and peripheral facilitation was adopted. From an HA perspective, however, insourcing serves a crucial purpose. Without insourcing, the likelihood of some populations being completely cut off increases because of the difficulty of operating in such contexts, limited monitoring capabilities, and lower operating budgets of implementing HOs. E.g., the plight of the Rohingya people of Myanmar would likely be worse if there were no insourcing IHOs to serve the population.

The differing trade-off implications of insourcing and outsourcing at the level of the conflict environment means that trade-offs can balance each other leading to sector-level achievements that are better than those of individual IHOs. Furthermore, in

addition to the tendency to simplify operations insecurity increases, IHOs are also often specialised in their service offering, e.g., only focusing on medical, water and sanitation, and food provision service. So, we speculate that the wide range of humanitarian needs are better met if, and only if, different IHOs operate in a given environment.

Propositions on trade-offs and OM objectives

Based on the preceding discussion, we present our second set of propositions on the relationship between sourcing strategies and trade-offs in different conflict environments.

Proposition 2: Different IHO sourcing strategies incur different trade-offs within and across conflict environments with the implication that the humanitarian ambition becomes more achievable as IHO sourcing strategies vary.

Proposition 2a. In C-Lo, G-Lo, and Go-Gl conflict environments, quality and speed are typically traded off against continuity and coverage. The best quality and speed outcomes are associated with insourcing while the best continuity and coverage outcomes are associated with outsourcing.

Proposition 2b. In C-Gl conflict environments:

i. there are cross-cutting trade-offs between humanitarian and OM concerns. Insourcing primarily secures HA concerns while outsourcing primarily secures OM concerns.

ii. In the least [most] extreme situations, insourcing [peripheral facilitation], coupled with remote management [remote support], is positively associated with greater accommodation of humanitarian [operations management] concerns.

Proposition 2c. As the severity of security incidents increases, insourcing [outsourcing] costs increase [decrease] substantially and OM effectiveness decreases substantially [increases marginally].

Performance Implications

Before developing the performance-related propositions, we begin by recognising the general performance measurement challenges in humanitarian operations (Anjomshoae et al., 2017) which are likely exacerbated by two key results from our study. First, the duality of purpose in efforts to directly influence the environment

implies that some IHOs sacrifice direct and short-term OM outcomes for the more enduring reform or revamp efforts. Therefore, judging such IHOs solely on the direct outcomes would be missing their most significant contribution to the sector. Second, due to monitoring challenges related to outsourcing, the varying trade-offs between outsourcing and insourcing, and variations in operational approaches (see previous section on sourcing strategies, objective, and trade-offs), it is difficult to precisely assess the impact of different sourcing strategies, especially within conflict environments.

Despite the aforementioned performance measurement challenges, there is a discernible difference in performance outcomes across conflict environments (Figure 2). We find that IHOs achieve better coverage- and speed-related outcomes in locally-oriented conflicts and better continuity- and quality-related outcomes in globally oriented conflicts. As security challenges are at their worst in the latter, a possible explanation for this is that the lower frequency of attacks enables better overall stability. Indeed, most respondents mentioned the challenge of “ebbing flow” of access due to frequent unrest in locally-oriented conflicts and the subsequent difficulty of ensuring continuity. This leads to a situation whereby *IHOs* address needs *whenever* they can. In globally-oriented conflicts, however, they tend to meet needs *wherever* they can. That said, sector-level gains in all conflict environments are higher than individual IHO gains as different sourcing strategies and identities imply that they may very well access different areas at different times.

The cost implications of insourcing clearly worsen from, in ascending order, C-L, Go-L, G-GI, and C-GI conflict environments due to the adoption of multiple security strategies and other measures taken to achieve some level of functionality. The main cost implications associated with outsourcing relate to monitoring costs. These generally increase conflicts become globally-oriented due to worsening insecurity but taper off as access challenges worsen. Unlike with other outcomes, IHOs still have some control over costs incurred. They can make decisions about which costs to prioritise and how. For example, when peripheral facilitation is adopted in C-GI conflict environments, accountability requirements almost diminish which then reduces monitoring costs. Hence, we see costs as sitting in the middle between continuity and quality versus coverage and speed (Figure 2). Between insourcing and outsourcing, there are indirect costs that we cannot capture (e.g., sums of money paid

to the personnel/ implementing HOs, training and development costs, and recruitment costs), but the direct costs of insourcing appear to be higher.

Propositions on OM outcomes

Based on the preceding discussion, we present our third and last set of propositions on the overall OM performance implications of adopted OS in different conflict environments.

Proposition 3: Locally- and globally-oriented conflicts, though both characterised by diversity of sourcing strategies applied by IHOs, have differing performance implications.

Proposition 3a. The combination of strategies applied by IHOs in locally-oriented conflicts are more positively [negatively] associated with coverage and speed [quality and continuity] overall.

Proposition 3b. The combination of strategies applied by IHOs in globally-oriented conflicts are more positively [negatively] associated with quality and continuity [coverage and speed] overall.

Proposition 3c. Direct insourcing [outsourcing] costs increase [decrease] as conflicts become more globally oriented.

Research Implications

Our results have major research implications. We discuss the four most important ones.

First, none of the studied IHOs has an explicitly specified OS in the sense that it is understood in OM. Despite this, we could map and identify the dominant OS (i.e., part of the classical modus operandi) of each studied IHO and how they adapt it to address the security challenges brought on by each conflict environment. We find support for Mintzberg's (1978) argument that this is to be expected in highly uncertain environments; strategy emerges gradually- even unintentionally- and becomes consistent over time. In addition, when facing hostile environments that are highly volatile and uncertain like the ones studied, organisations must have an "operational reconfiguration" capability: investing in resources (material and immaterial) that enable them to build contingencies (Pandza et al, 2003). In turn, these contingencies enable organisations to appropriately adapt to changes in the environment (Wu et al., 2010). Thus, future OM research should further explore emergent OS in hostile

environments and how organisations can retain a balance between enduring and fluid elements of strategy to ensure adaptability and fitness for purpose.

Second, our results are in line with the trade-offs model, showing that no single IHO is outstanding enough to meet all performance objectives (Sarmiento et al., 2018; Skinner, 1996b). We find this to be the case within and across all conflict environments. Furthermore, the same IHO may excel on a specific performance objective within a given conflict environment but underperform on the same objective in other conflict environments. This suggests that vulnerability to specific environmental factors has an impact on the realisation, or even pursuance, of performance objectives. In addition to this insight on trade-offs within versus across conflict environments, there are some key differences between our findings and the extant literature.

One difference is that we find IHOs to be less preoccupied with resource considerations, something which dominates the OM literature on trade-offs (Boyer and Lewis, 2002; Mentzer et al., 2008). In hostile environments, cost is typically the sacrificed objective (some IHOs are even willing to deliver assistance at any cost) as IHOs try to deal with predominantly nondiscretionary environmental factors (Liu et al., 2018). Another difference, ironically, is that the how IHOs seek to directly influence the environment further limit their choices of the performance objectives to prioritise. For example, speed is generally inconsistent with reform-oriented IHOs adopting an insourcing strategy. Overall, these results imply that trade-offs can be imposed rather than selected. Specifically, in hostile environments, organisations must establish what is possible – often from a set of bad options – for fulfilling at least part of their mission. There is, therefore, a need for research on hostile environments exploring how environmental conditions and organisations' responses to them directly and indirectly influence the trade-offs "decision".

Third, the trade-offs literature has also primarily focused on organisational level considerations but our results suggest that sector-level performance is crucial in this setting. Employing varied strategies by IHOs in each conflict environment can facilitate this as their trade-offs cancel each other out. At present, however, it appears that *IHOs work together apart*, i.e., they hardly collaborate but the different trade-offs they make and spillover effects enable them to contribute to, and benefit from,

each other's efforts to cope within the humanitarian landscape more generally. Thus, it appears that for HA, there is a need to think about strategic alignment of different IHOs to achieve better sector-level outcomes vis-à-vis the humanitarian ambition. A network level perspective, as opposed to an IHO-level perspective, is needed. This can facilitate the establishment of the best portfolio of strategies and spillovers that can lead to the best possible OM outcomes within and across conflict environments. This line of inquiry can also be extended to hostile environments more broadly.

Finally, key conceptual OM frameworks on environmental factors have included munificence which is concerned with the scarcity or abundance of resources needed (Castrogiovanni, 1991; Dess and Beard, 1984; Sirmon et al., 2007). For IHOs, there does not seem to be a challenge in terms of abundance of options for their resource bases. There is a proliferation of potential partner organisations/ personnel in all conflict environments. However, there is munificence in that it is difficult to find the right actors, especially in globally oriented conflict environments. Major IHO concerns are usually about whether they can build the capacity of existing actors in hostile environments and whether they unwittingly transfer or worsen risk for those partner organisations/ personnel. Solving this puzzle will alter the humanitarian landscape in ways not previously imagined. There is a role of OM in exploring organisational forms and governance mechanisms that can, among others, address the transfer of risk to implementing HOs and fiduciary risk arising from an inability to properly monitor operations.

Implications for Practice

Our most important implication for practice, which we cannot overemphasise, is how much IHOs need each other. Despite their stark differences- or perhaps because of them, the humanitarian ambition is a sector-wide endeavour! We offer four primary reasons for this. First, individual IHO approaches in seeking to influence the environment lead to spillover effects that benefit the sector at varying extents across conflict environments. Second, sourcing strategies (typically directly derived from the modus operandi) lead to differing trade-offs within conflict environments. The only way to achieve the best outcomes is at the sector level where diversity of strategies can be achieved with less compromise on values. Third, IHOs often have to choose between gaining access in the short term and risk losing it in the longer term or taking too long to gain access but be likely to retain it in the longer term. It seems best to be able to

exercise both options but this can only be achieved by IHOs that take different approaches working in the same context. Quick access enables saving more lives in the short term while sustained access enables preservation of life in the long term. Fourth, we also generally find that the studied IHOs, with the exception of Organisation C, focus primarily on specific services. To increase the variety of goods and services available to beneficiaries and, therefore, meet their needs more holistically, diversity of IHOs within conflict environments is necessary. Because of this, although we think that ongoing critical discourse within the sector is needed now more than ever, we caution that IHOs that are more inclined to react to the environment should be wary of overly criticising those IHOs that are more focused on reform. The former may very well be benefiting from the less obvious results of the latter's efforts.

Our findings further lend support to the importance of principled humanitarian action for enabling operational success but also reveals the impossible choices that sometimes have to be made in order to access populations in distress. Notably, the challenge of working in C-GI conflict environments is unprecedented. It is increasingly difficult for IHOs to achieve good results through insourcing (and without violating humanitarian principles) but also difficult to evaluate the respect for humanitarian values and operational effectiveness of implementing HOs if outsourcing is adopted. IHOs are increasingly forced to settle for outsourcing or adopting the peripheral facilitator strategy to avoid creating or leaving operational vacuums. As control is gradually relinquished to agencies that IHOs have never met and whose values they cannot assess, it is our view that these approaches are, for better or for worse, altering the value-based foundations of HA in profound ways.

Staff profiling also poses a major dilemma for IHOs. This approach may already be under scrutiny as the sector begins to grapple with the challenges of institutional racism and other issues of diversity and inclusion (Daoust and Dyvik, 2021; Slim, 2020). From a humanitarian assistance viewpoint, however, profiling is a leap in terms of reducing security incidents and improving access through acceptance. We, therefore, advocate a measured response to the aforementioned challenges and any implications for providing humanitarian assistance in some of the most dangerous places in the world. It may be best, for instance, to measure an IHOs success in tackling issues of race and inclusion at an organisational level instead of project level.

Finally, the prevailing need for new organisational forms is leading towards greater localisation and this is a positive development. Local organisations are expected to show that they can do the job at an acceptable standard but whether they succeed remains difficult to evaluate because of the performance measurement challenges within the sector. There is a need to develop performance measurement systems that foster novelty, creativity, can be used for strategic purposes, and lead to actual improvements (e.g., Moxham, 2009; Radnor and McGuire, 2004). Equally importantly, local organisations should not be held to unrealistic standards. The lessons learned by IHOs in their own efforts to work in conflict environments should inform any future decisions about performance and reporting standards. Although the potential benefits of localisation are high, we caution that there should be no urgency to pursue localisation across all conflict environments as (i) insourcing by IHOs and outsourcing to local implementing IHOs lead to different trade-offs and outcomes and (ii) there is currently a limited understanding of how it alters the foundations of HA-for better or for worse.

4.6 Conclusion, Limitations, and Future Research

Our research sought to diagnose the state of the humanitarian ambition to meet needs wherever they may exist in hostile environments. We merged two dominant perspectives in HA and OM to explore how, and for what purpose, IHO MOs inform their coping strategies and affect operational outcomes in different conflict environments. In general, we find that the humanitarian ambition comes closest to being realised at the sector level because of external spillovers from seeking to influence the environment and varying trade-off implications for different strategies within and across conflict environments. We identify three sources of spillovers namely, reform, revamp, and react. When reform and revamp efforts are successful, other IHOs directly benefit via improved overall environmental conditions. Successful efforts to react to the environment are mimicked and/ or adapted by others. For these reasons, there appears to be no best strategy for operating in any of the studied conflict environments. As different strategies inherently imply different trade-offs, the overall contribution of all IHOs in each conflict environment appears to be significantly greater than their individual achievements as they make up for the shortcomings of each other's strategies.

That said, there are clear major limitations of the IHO model under increasing hostility which points to a need to accommodate other organisational forms to keep the humanitarian ambition alive. Given the exploratory nature of this study, several limitations remain to be addressed. Sampling more countries is needed to have full representation of conflict environments and to improve reliability and validity. This work is already in progress.

In addition to the future validation of propositions set out in the previous section, we offer multiple exciting future research directions for researchers with an interest in this developing field within OM. First, we reiterate the need for research on improving performance measurement in humanitarian operations (Abidi et al., 2014; Anjomshoae et al., 2017; Chiappetta Jabbour et al., 2019). Our research shows the presence of spillover effects that have so far been unaccounted for. Though admittedly the most difficult to assess, establishing ways of measuring spillover effects reduces the risk of over/under-attribution of outcomes to individual IHOs which can have major consequences for OS in the humanitarian sector. Also, given our findings on the importance of principled HA and that some values pay off only in the long run, performance measurement considerations in future research ought to seek balance between the need for quick results in the sector and securing the long-term interests of the sector.

Second, more research is needed on spillovers, positive and negative, as this can settle some of the raging debates in HA about different organisational choices and how they impact the ability to meet needs wherever they may exist. An example is how environment-altering spillovers can inform behaviour of different actors and whether they cut across time and across environments (Nilsson et al., 2017). This may also help to further clarify causal relationships in the sector leading to better means of gathering evidence that informs future policies and strategies.

Third, more longitudinal and interdisciplinary research can explore further overlaps between HA and OM in the future. We already find evidence of cross-cutting trade-offs between HA and OM objectives and suspect that this may permeate multiple points of intersection between HA and OM considerations that fall beyond the scope of our research. There is also a need for more systematic work on operationalising HA concerns within the OM domain. For example, although we find that certain IHO

modus operandi elements have no clear benefits for the attainment of OM objectives, they may very well impact funding support and this is crucial for IHOs' ability to operate.

Finally, our research provides rich insights on the strengths and limitations of IHOs in delivering on the humanitarian ambition. There is, for instance, a need to investigate the implications of embracing remote approaches (remote management and remote support) and ways of making them more viable and sustainable. The rise in the development of alternative operational models currently raises more questions than they address issues. As the Covid-19 pandemic also shows us, insecurity is not the only reason that direct IHO access may not be a sustainable future model. Thus, there is a need to shift the focus from negative and controversial implications of alternative models (Donini and Maxwell, 2013) to the positive ones and establishing how the former can be addressed. We also cannot fully grasp the state of HA and the humanitarian ambition without an understanding of other organisational forms. Local HOs are a top priority as their role has been steadily increasing but little remains known about how they get along in places where IHOs fear to tread.

Chapter 4 Appendices

APPENDIX I: Content Analysis Method and Results

Quantitative Content Analysis of Activity reports

We started our research process with a content analysis of activity reports published by the case IHOs in the period 2010 – 2015, with late 2010 coinciding with onset of the Arab Spring. The approach was proposed by Kunz (2019) and has been applied in previous humanitarian operation studies. Since organisations often change their strategies in spurts rather than continuously and in response to major changes (Mintzberg, 1978), using the Arab Spring as a reference point for our investigation was expected to enable us to capture the adaptive strategies of IHOs to the changing face of conflict. In the absence of substantial OM research and theoretical insights on this topic in general, we used this secondary data analysis as a starting point to identify real-world experiences of the type of insecurity related issues as conveyed by the case IHOs over this period. The objective of this first methodology was to identify emerging themes from the IHOs' discourse about insecurity and related themes. In addition, we used this approach to identify possible trends in insecurity-related themes. The discourse about the *security challenges* theme by far dominated all others from 2012 onwards- supporting our initial assumption that the onset of the Arab spring was a turning point in the changing face of conflict.

Data collection

Every year, IHOs publish activity reports that are publicly available on their websites and often targeted towards (potential) donors. Because of their public nature, IHOs pay close attention to the content of these documents. IHOs have to report their achievements and challenges in an accurate way as host country governments, charity watchdogs, and the media can access them. This accuracy, as well as similarity in structure over the years, imply that these reports represent a particularly useful secondary data source for the purpose of our research.

We do acknowledge, however, that the public nature of these documents may also deter organisations from reporting certain types of challenges (e.g., in order to avoid retaliation from a host government), or IHOs may want to over-emphasize certain challenges as part of an advocacy agenda. In part, this limitation, informed our choice to employ the mixed method approach as it innately addresses such limitations.

Analysis

We analysed our reports using an automated quantitative content analysis approach proposed by Kunz (2019). This method has been applied in previous studies in humanitarian operations, and was particularly adapted to this research for two reasons. First, the activity reports can be very long (up to 600 pages), and analysing them manually would be cumbersome. Second, a manual content analysis always involves some level of subjectivity, which reduces the validity of the outcome. An automated quantitative approach followed by a manual verification of coding therefore seemed to be the best choice for analysing the activity reports of our case organisations.

The approach was applied as follows. A *descriptive analysis* of the reports showed that each IHO publishes them at different lengths. Table A1 provides an overview of the number of pages of all reports. It was also obvious that different IHOs follow different reporting styles and standards, with Organisation A (Org A) typically publishing reports of over 500 pages, whereas Organisation C (Org C) and Organisation D (Org D) typically have reports around 50 pages. The reports contain 1,655,774 words in total, of which there are 25,604 different words.

Table A1: Number of pages per activity report

Year	Org A	Org B	Org C	Org D
2010	584	112	25	65
2011	516	120	25	30
2012	564	104	48	59
2013	624	104	52	44
2014	622	96	56	71
2015	624	100	68	69

We then followed an inductive approach for *selecting dimensions, themes and codes*. This selection process is an important step in the content analysis process, as it defines the coding structure. Similar codes are then organised in different themes, which are themselves organized along different dimensions. To avoid an unnecessarily tedious process, we first listed all words occurring 10 times or more in the IHO reports thereby excluding rarely used words. The 10-words threshold is purely arbitrary and defined by the researcher in order to generate a manageable amount of words while

⁵ At the time of analysis, Org D had only published a summarized version of its 2010 report.

considering the significance of the words around this threshold. This step substantially reduced the number of words to be analysed from 25,604 to 8,015. From these 8,015 remaining words, we manually identified the ones related to insecurity affecting IHOs. The first two authors conducted this identification of words independently and then jointly reconciled the list of the identified words.

The two authors then created codes based on the identified insecurity words. At this stage, they combined words with the same root into one single code. The words ‘attack’, ‘attacks’ and ‘attacked’ were, for example, combined into the code ‘ATTACK’. The authors then classified the different codes into logical groups of concepts, which formed our dimensions and themes. This process was discussed between both researchers until we came to an agreement about a single classification structure.

For the *evaluation of the material*, we used the auto coding function of the content analysis software Atlas.TI. With this function, codes are assigned automatically to specific words based on the predefined coding structure. In the example described above, the software coded all words ‘attack’, ‘attacks’ or ‘attacked’ in any document with the code ‘ATTACK’. In order to reduce the risk of wrong coding, we manually confirmed each code assigned by the software. This lengthy process of verification was required to make sure that we coded only the words that were actually describing insecurity related events affecting IHOs. For example, in Org B’s annual reports, the word ‘access’ was frequently used in reference to their Access Campaign which seeks to address access barriers to affordable medicines caused by major pharmaceutical companies among others. In such instances, we manually un-coded the word ‘access’ as it was not used within the context of insecurity. However, if the word described loss of access following a security incident, for example, we retained the coding. Table A2 (also Table 2 in chapter 4) shows the dimensions of our analysis as well as the related themes for the codes we derived from the reports.

After the coding process, we calculated the occurrence of insecurity codes in each report and for each IHO. Because the lengths of the activity reports vary substantially (Table A1), we normalised the frequency of keywords to the length of each report as shown in Equation 1 (Kunz, 2019).

$$F_{i,j} = \frac{x_{i,j}}{W_j} \quad \text{Eq. 1}$$

Table A2: Top four dimensions and themes of codes emerging from the content analysis

Dimension	Theme	Description
Insecurity Words used in direct reference to insecurity	Security challenges	These are largely related to security incidents, means of attack, and real or perceived risks.
Humanitarian concerns Words capturing concerns that are specific to, and highly influential in, the humanitarian setting	Access	The unhindered presence and movement of IHOs to reach and serve beneficiaries (beneficiary access through travelling to the IHOs or their facilities was not covered).
	Values	Broadly speaking, humanitarian values, which entail universal humanitarian principles as well as organisation-specific values and identity.
Dealing with insecurity Words that describe how IHOs (attempt to) deal with insecurity	Mainstream security strategies	Strategies that are part of the security triangle (acceptance, protection, deterrence), remote management, and avoidance were labelled as mainstream strategies because of their widespread recognition and use.
	Networks/partnerships	Loose connections/ long-term meaningful relationships in as far as they were used in response to insecurity.
	Other responses	Words capturing other ways of dealing with insecurity. This includes generic words like “cope” where it was not specified exactly how an IHO coped.
Operations Management Issues Words related to the impact of insecurity from an OM perspective	Performance impact	Captures both OM measures like timeliness and efficiency as well as less concrete measures like unhindered access
	Facilities	Primarily facility (vulnerability to) attacks; some references to facility location (decisions).
	Logistics	Logistics activities and decisions including routing, stock management, transport, and procurement.

The formula calculates the relative frequency $F_{i,j}$ of a theme i in a report j as the absolute number of times a code from theme i appears in a document j divided by the number of words W_j in that document, multiplied by 1,000,000 (to represent the word usage per million words). Using this relative measure allows comparing the mentions of insecurity related themes over time and across organisations.

Key Results

To obtain an overview of the discourse on insecurity and related issues over time, we plotted a graph that shows the trends for each of the identified dominant themes, from most to least cited (Figure A1).

Within and across dimensions, there were some noteworthy similarities and differences regarding the top four mentioned themes. The discourse about *security challenges* by far dominated all others from 2012 onwards- supporting our initial

assumption that the onset of the Arab spring was a turning point in the ever-changing face of conflict. Within the security challenges dimension, words related to insecurity sharply increased between 2011 and 2012 and continued to dominate the discourse in the annual reports until the end of the analysis period. The themes related to humanitarian concerns, i.e., access and values, generally moved in opposite directions. Consequently, *access* issues increased as security challenges increased, but mentions of *values* decreased. This raised the question as to whether IHOs invoke values less in the presence of greater insecurity and access issues. Given that they have traditionally depended on values for protection and access, this was a crucial question to follow up on during the interviews and to ascertain the implications from an OM perspective.

Within themes about dealing with insecurity, *networks/ partnerships* dominated the discourse more than *mainstream strategies* (remote management and acceptance) and *other responses* (e.g., negotiation and contingency planning). Although networks/ partnerships were the most unstable theme in terms of mentions from year-to-year, they were consistently by far the most mentioned in this category. Other responses generally got more mentions than the mainstream strategies. Taken together, these results raised two key questions. First, what accounts for the instability of the theme on networks/ partnerships? Secondly, are IHOs adapting by moving from the traditional security strategies to other means of coping?

The dimension related to OM showed that the performance impact of insecurity, as well as logistics and facility-related (particularly the safety of facilities) issues increasingly dominated the discourse in annual reports over. Issues related to *performance impact* were the most dominant in this theme. Mentions of *facilities* steadily rose over time to eventually have dominance over *logistics* by 2013. This was surprising given that most violent attacks in conflict settings happen in transit (Aid Worker Security Report, 2014).

Insecurity-related discourse over time (All IHOs)
(per million words)

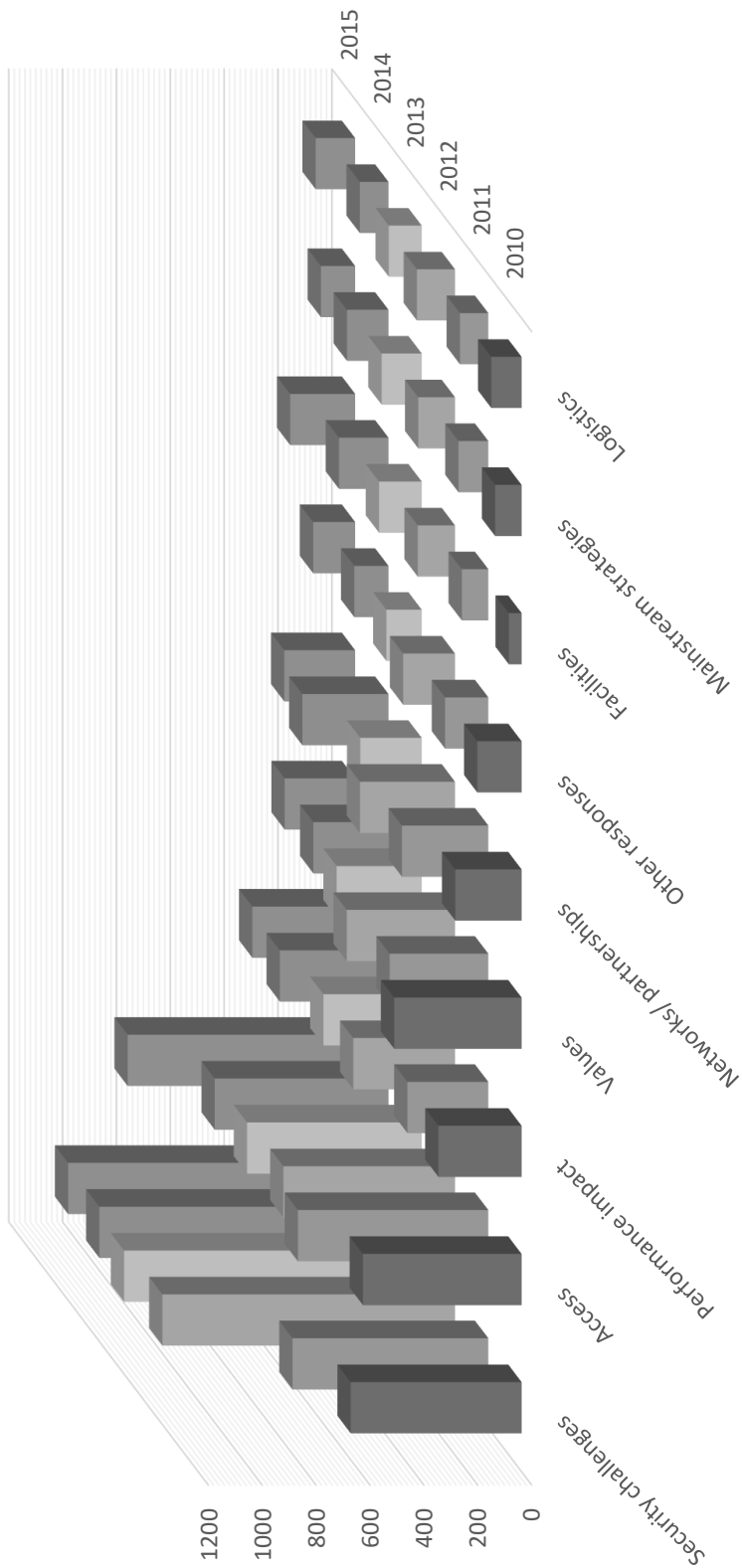


Figure A1: Main themes of insecurity-related words in annual reports and corresponding mentions per million words (all IHOs)

APPENDIX II: Subject-Matter Expert Interviewees**Table A2: Expertise of interviewees**

Respondent ID and role
R1 – Access and humanitarian negotiation
R2 – Conflict and organisation
R3 – Humanitarian health services and public health in conflict settings
R4 – Religion, conflict, and peace-building
R5 – International humanitarian action
R6 – International security and relations
R7 – Military disaster relief operations

We developed an interview protocol with a focus on refining and validating the overall emerging trends, their validity, and importance. The protocol also covered questions of conflict environments. We conducted seven (7) interviews with seven (7) participants and the mean duration of each interview was 55 minutes.

APPENDIX III: Words Coded Under Each Theme

Table A3: Complete list of words coded under each theme

Theme	Words coded under theme
Security challenges	Abduction, attack, banditry, burn, bomb, ceasefire, chaos, damage, destroyed, checkpoints, coup, crime, danger, death, escalation, evacuation, explosion, gunshot, harassment, hostile, incident, insecurity, instability, intimidation, kidnapping, kill, looting, murder, restrictions, riot, risk, safeguard, safety, stolen, target, tension, terrorism, threat, unrest, unstable, volatile, withdrew
Access	Access, inaccessibility
Values	Identity, impartiality, independence, neutrality
Performance impact	Barriers, challenges, constraints, hampered, hindered, disruptions, effectiveness, efficiency, inadequate, timely
Logistics	Corridor(s), distribution, import, passage, procurement, routing, stock, transport, truck
Facilities	Facility, infrastructure
Mainstream strategies	Remote (management), acceptance
Networks/ partnerships	Collaboration, engagement, network(s), partnership(s)
Other responses	Adaptation, contingency, cope, mitigate, negotiations

APPENDIX IV: Modi Operandi & Operational Implications Across Conflict Environments

Table A7: Org D's MO, inherent weaknesses, and approaches for influencing or adapting to the environment

MO ELEMENTS	CORE STRENGTHS	Relevant in:				INHERENT WEAKNESSES	Relevant in:				ADAPTATION MEASURES	Relevant in:			
		19	10	99	90		19	10	99	90		19	10	99	90
Value-based Incorporating religious identity and proselytising in operations	Enables access through acceptance and reconciling grassroots and leaders of different religions	✓				If Org D's religious identity is rejected by warring parties/ communities, Org D experiences access challenges Less effective in reconciling groups when: - individuals are radicalised - the environment is highly unstable in terms of frequency of security incidents - there are too many groups involved in the conflict	✓	✓	✓	✓	Conceals religious identity and/ or does not proselytise	✓	✓	✓	✓
					✓		✓	✓	✓	✓		Substantially outsources goods and services delivery to local organisations who are then remotely managed	✓	✓	✓
No weapons principle	Enables access through acceptance and perceived neutrality by warring parties	✓				Access is "fluid" (R17) in volatile conflict environments/ periods of intense fighting	✓	✓	✓	Using air drops and in-and-out missions to deliver goods to beneficiaries	✓				
										Having multi-country operations to serve fleeing populations across the border					✓
										Negotiation for unhindered access with warring parties and advocacy	✓				✓
										Occasionally seeks protection services from, e.g., peace-keeping forces	✓				✓

MO ELEMENTS	CORE STRENGTHS	Relevant in:				INHERENT WEAKNESSES	Relevant in:				ADAPTATION MEASURES	Relevant in:			
		15	17	19	20		15	17	19	20		15	17	19	20
Distancing self from parties whose neutrality is in question	Enables access through acceptance by warring parties	✓		✓		Limits collaboration opportunities in highly unstable conflicts w.r.t security	✓		✓		Negotiation for unhindered access with warring parties and advocacy	✓		✓	
Management positions only for those with Org D's religious identity						Unable to ensure access and continuity of operations in countries with (predominantly) different religions			✓		International staff are brought in on a temporary basis			✓	
Most staff are involved in making decisions of consequence to identity and strategy						"Bureaucratic slowness in decision-making" (R17) compounded by the organisation's size			✓						
Other															
Hiring national staff in management positions	Understanding of complex context-specific issues enhances continuity and meaningfulness of operations	✓													
Planning cycles of at least 15 years (due to original development orientation)	Continuity of operations and funding in protracted crises	✓		✓		Organisation cannot keep up with the pace of dynamic conflict environments			✓		Outsources the delivery of humanitarian goods and services to local organisations			✓	

CHAPTER 5

Conclusion

This PhD thesis explored OM in knotty contexts, specifically in the humanitarian setting. It sought to simultaneously learn about the humanitarian context and how OM can contribute to strategic organising in such contexts. To achieve this, I merged well-established OM tools and concepts with well-developed theories and concepts from other research fields. The main output is three empirical papers focusing on complexity, extremity, and hostility individually; respectively, along the OM functions of logistics, supply chain management, and operations strategy. From political science, institutional theory was used to understand how host governments, as crucial political actors in complex emergency settings, impact the logistics function. From sociology, complex adaptive systems theory was used to explore how IHOs develop adaptive capabilities under extreme conditions in concurrent crises, i.e., overlapping disaster situations. From the field of humanitarian action (HA) *modi operandi* were linked to important OM considerations for strategizing to explore the strengths and limits of IHOs in hostile conflict environments. Combined with a case-study design, these approaches enabled intense and in-depth engagement with the knottiness that remains little understood in OM, but is increasingly characteristic of multiple operational environments.

5.1 Implications for Practice

For a long time, the issues faced in humanitarian operations were deemed to be unique to the sector. The unrelenting and rapidly evolving challenges the world is facing due to COVID-19 and its broader effects on operations across the globe demonstrates that, as argued by other researchers, they are also characteristic of major crisis situations (Carroll and Neu, 2009; Kovács and Falagara Sigala, 2021; Pettit and Beresford, 2005). Thus, there are implications for humanitarian crises and others beyond the sector.

Humanitarian Crises

For the humanitarian sector, each chapter offers insights for improving outcomes under different environmental conditions.

Complexity (Chapter 2) – The research identifies four host government stances: non-restrictive, opportunistic, selectively accommodating and uncompromising. Non-restrictive and opportunistic host governments tend to have low regulatory and enforcement capabilities which renders any existing tensions latent. In contrast, selectively accommodating and uncompromising governments have high levels of both (tension and capabilities). These stances impact logistics in complex emergencies including the ability to pursue efficiency, invest in longer-term planning, and implement contingency strategies for dealing with uncertainty.

For non-restrictive host governments, practitioners can focus on best practices as decisions and outcomes will be hardly influenced by the host government. Carefully selecting distribution channels, modes and frequency of transport and minimising buffer stocks are some possible considerations. However, with opportunistic host governments, it is important to take account of host government actions that cause uncertainty and, thus, affect timeliness. Just-in-time approaches are unlikely to work and it is advisable to create buffers in anticipation of government-induced disruptions. Another consideration could be forming alliances with other IHOs to improve accessibility of supplies, e.g., by sharing in-country stocks when some IHOs' goods are held up at customs.

In countries with a selectively accommodating host government, it is advisable for practitioners to largely base decisions on the options that are available to them (e.g., accept long lead times and plan accordingly) and reserve negotiations for matters of paramount importance (e.g., seeking exceptions to quantity restrictions in order to cope with demand uncertainty). Over-engaging with host governments could compromise IHOs' ability to influence any host government choices. With uncompromising host governments, negotiations with authorities often fail. However, some level of certainty can be achieved if practitioners prioritise understanding the regulations and being compliant. This implies the need for advance planning on both inventory management and transport. Where host governments restrict IHO access to

certain areas, establishing close partnerships with local organisations and building their capacity to respond can be an appropriate strategy.

Extremity (Chapter 3) – A key finding is that different overlapping disaster situations can lead to different node and network level outcomes within humanitarian supply networks. These differences can be explained by factors that facilitate or inhibit supply network members' ability to address changes in the operational environment. These changes can be supply, demand, and/ or process related. Furthermore, supply network members develop mechanisms for specifying roles in the preparedness phase (i.e., role definition, role clarity, role assignment, and role floating) and the response phases (i.e., role enactment, role (re-)assignment, and role exploration). If the supply network endures extremity for an extended period, this can cause inevitable disruptions across the network. This arises because supply network members' ability to sufficiently respond is diminished and/ or they are not willing to expend more (long-term) resources towards a temporary crisis.

The appropriate combination of member roles that minimise performance impact depend on the foreseeability of sudden onset events, the events' overall impact, the duration of this impact and the environmental facilitators and inhibitors. Facilitators/ inhibitors can, for example, be whether the government of an affected country declares a state of emergency and the availability of alternative transport routes into the country. When facing familiar situations (such as in the Chad cholera outbreak), to the fullest extent possible, role clarity and role assignment in the preparedness phase and role enactment in the response phase enhance supply network resilience. For unfamiliar situations (such as in the cholera outbreak in Haiti), however, floating certain roles in the preparedness phase while being flexible to (re-)assign and explore those or other emerging roles in the response phase enhances supply network resilience.

Hostility (Chapter 4) – The study develops a typology of conflict environments which is based on two dimensions: their reach in terms of the actors drawn into the conflict (local versus global, typically governments or armed groups) and the dominant issues driving the conflicts (goods versus creed, e.g., material resources and ideological differences, respectively). Both dimensions are seen as a continuum rather than strictly categorical and yield four primary conflict environments: goods-dominated,

local (Go-L); creed-dominated, local (C-L); goods-dominated, global (Go-Gl); and creed-dominated, global (C-Gl). The implications of conducting humanitarian operations in each of these four environments were found to be highly dependent on IHOs' identities and mandates. IHOs try to influence the environment through reforming (e.g., improving general respect for humanitarian actors to reduce targeted attacks), revamping (e.g., increasing the effectiveness of the policing function to combat crime), and/ or reacting (e.g., initiating a response like publicly speaking out against the actions of a particular government or armed group to quickly improve operating conditions) to it. Successful efforts to influence the environment lead to spillovers that benefit the actors in the same environment and, hence, the sector. IHOs also try to adapt elements of their *modi operandi* to different sourcing strategies across conflict environments. Depending on their ability to access beneficiaries, they may insource, outsource, and/ or use peripheral facilitation whereby they support other actors with access but do not (seek to) control their decisions and actions. Each decision carries inherent trade-offs between relevant performance objectives which are found to be cost, quality, speed, continuity, and coverage. When insourcing, IHOs must also decide on the appropriate security strategies.

Because of differing trade-offs for each sourcing (and security) strategy across conflict environments, the appropriate sourcing strategy ultimately depends on what an IHO deems most important and how loosely it interprets its fundamental values (e.g., the no weapons policy) and/ or is willing to compromise on them. Generally, in locally-oriented conflicts, insourcing (coupled with acceptance and protection security strategies) leads to the best quality and speed outcomes while outsourcing leads to better continuity and coverage. In Go-Gl conflicts, similar results are achieved for both sourcing strategies. The difference compared to locally-oriented conflicts is that insourcing IHOs must employ more security strategies (i.e., acceptance, protection, deterrence, and remote management) to improve outcomes. In C-Gl conflicts, good quality outcomes can be achieved through insourcing and employing the same four security strategies as in Go-Gl conflicts. However, better quality outcomes can sometimes be achieved through outsourcing, which also offers better continuity and coverage. When either option is not viable, peripheral facilitation becomes the best approach but accountability, a major concern in HA, likely diminishes. Costs vary

considerably among IHOs depending on how much they invest in security when insourcing and monitoring when outsourcing.

Other Crisis Situations

As COVID-19 is the only relatable reference point beyond the humanitarian setting, I refer primarily to it for general practical implications. I expect, however, that these implications apply to any crisis situation or operational environment characterised by complexity, extremity, or hostility.

The key insight from the first empirical paper is that, in politically charged crisis situations, host government behaviour, as informed by government dependency and conflicting interests vis-à-vis IHOs, lead to various challenges in logistics. The behaviour of governments in response to the Covid-19 pandemic suggests that the government stances identified in the first paper are not unique to humanitarian crises. If tensions soar and there are different levels of dependency, governments everywhere will do what they can to secure supply and protect their interests. The richer governments have been the most uncompromising, often imposing import restrictions and elbowing poorer governments in the race to vaccine access. Poorer governments have been non-restrictive, taking whatever they can get, and being anything but critical of the help coming their way. Based on these observations, it seems sensible for organisations to prepare for the impact of politics on their logistics activities in crisis situations. In some situations, establishing the rules early and focusing on compliance will be the best strategy even though it would be time-consuming and cause delays at first. In other situations, putting in effort to read the situation accurately and taking appropriate measures to avoid repercussions in the long-term is advisable. This largely applies to situations where the government does not yet have the power or means to address existing tensions, making it difficult for organisations to discern them and mitigate future effects.

The second empirical paper shows that extremity can be a double-edged sword, both creating insurmountable challenges and rare opportunities. While performance can improve or worsen following concurrent adverse events, this is not by chance. Supply network members must get better at managing imminent risks as the combined impact of adverse events unfolds; at the same time, they must become adept at finding the silver lining in the most extreme cases. In the humanitarian sector, this silver lining

tends to be a window of opportunity where even the most uncompromising governments are receptive of aid and facilitate the smooth flow of operations. During the COVID-19 pandemic, some countries relaxed competition laws and even financed innovative bids to tackle supply issues. Also consistent with our findings, the pandemic was characterised by periods of role exploration (via consortiums comprising actors from multiple industries) and re-assignment (via re-purposing of manufacturing) among major actors. All these were instrumental in closing the demand-supply gap created by the pandemic. Some researchers have argued that this capability to capitalise on crisis situations transcends resilience (Craighead et al., 2020; Nikoogar et al., 2021), but that remains to be seen as the OM community gets to grips with the concept. What is certain is that uncertainty will increase and, therefore, organisations and supply networks need to start thinking of crisis situations less as fleeting moments that they must merely survive. Beyond the effects of COVID-19 and current prevalent issues in the humanitarian sector, there is a need to think about how role floating can improve responsiveness in future crises of similar magnitude and their knock-on effects. The effects of such (concurrent) crises are enduring, intertwined, and can become regular features of the operational landscape. There is a need to develop the capability to actively look for ways to emerge better, more adaptable, and a little more comfortable with uncertainty.

The third empirical paper explores operations strategy in hostile environments and there are lessons to be learned more generally in other OM contexts. Arguably, hostility has largely been associated with competition and power in OM. As resource scarcity and instability become major threats, we can expect starker situations punctuated by worsening inequitable access to essential supplies. The humanitarian sector, for example, has battled with the issue of embargoes for decades, sometimes failing to get exceptions to source humanitarian supplies to or from some countries. This has, for several reasons, been experienced under COVID-19 with vaccine wars among rich nations being the most notable. However, greater hostility is looming. We may be on the brink of a global security crisis following the dramatic departure of Western troops from Afghanistan among others. Climate change continues to expose different parts of the world to extremes of hot and cold weather as well as drought and flooding. Hostility will only increase as all these issues worsen and the events causing them strike relentlessly and concurrently. Politics may have more influence and

impact on business as we know it when governments move to protect national interests. Our findings suggest that diversity of strategies and spillovers will be crucial for survival and continuity. How organisations and supply chains *work together apart* by acting independently but uniquely taking strides to contribute to improving operational conditions for their sectors will become crucial.

5.2 Implications for Research

Through the growth of humanitarian operations and resilience streams, research output on knotty contexts has continued to grow, but we have not quite mastered how we can engage meaningfully with such contexts in OM (c.f., Kovacs and Falagara Sigala, 2021). There remains a need for a decisive shift in how the field builds knowledge on knotty contexts and applies it more generally. I offer four key implications for the field emerging from this dissertation.

Firstly, this dissertation makes the case for more interdisciplinary approaches to cope with the unwieldy nature of the problems faced in crises. OM tools and techniques must evolve to enable the generation of more in-depth and generalisable insights. Tapping into the tried and tested approaches of other fields can advance the field in this respect. For example, the multiplicity of stakeholders needed to overcome the devastating impact of disruptive events has been known in the humanitarian sector (Majewski et al., 2010; Tomasini and van Wassenhove, 2009) and also came to light in the global COVID-19 pandemic. However, we still lack means of evaluating and contributing to the improvement of collaborative practices in such complex systems. In order to redress this, there is a need for OM research that, for instance, adopts organisational theory perspectives and sets out to develop a better understanding of collaboration processes in different operational environments, the role of central actors and the impact of who they choose/ are forced to collaborate with, and governance mechanisms for both temporary and permanent collaborations.

All that said, as demonstrated in the third empirical paper, there are also clear opportunities for OM research to lend its strengths to shed light on some contentious issues in other fields. For example, research that develops OM-related metrics for concretising ambiguous goals, which are characteristic of not-for-profit enterprises, would offer more objective ways of exploring the effectiveness of often contested measures. Therefore, there are opportunities in both directions.

Secondly, the field needs different approaches to thinking about OM problems in crisis situations (Craighead et al., 2020) and knotty contexts. What we problematize in those situations and contexts is one area that needs a shift in thinking. The strategy limitations that cause failure in humanitarian operations are neither new nor unique to the sector (Carroll and Neu, 2009). Therefore, assuming there can be conditions under which this failure is inevitable- and the resilience literature alludes to this (e.g., Tukamuhabwa et al., 2015; Wieland, 2021)- focus should be on how recovery is achieved. It may make more sense to problematise a failure to adapt rather than a failure to function as intended for a period of time. There is also a need to think about certain concepts more broadly. For example, how can power be expanded to capture hostility that comes from indirect supply chain relationships or agents in the environment who massively impact operations?

Thirdly, and related to the second issue, performance measurement for crisis situations need to improve. This remains poor in humanitarian operations research (Anjomshoae et al., 2017; Majewski et al., 2010). Although this research attempts to address this problem in all empirical chapters, we find that the ambiguity of goals (Tomasini and van Wassenhove, 2009) and the difficulty of attributing outcomes to specific actions and strategies still hampers understanding. This reflects the wicked nature of the problems in this context (e.g., due to the difficulty of defining problems, dealing with confusing information, and the presence of multiple stakeholders with conflicting values), yet every solution is a “one shot operation” (Lönngren and van Poeck, 2021; Tatham and Houghton, 2011). As we have seen during the COVID-19 pandemic, wickedness appears to permeate every sector in crisis situations. The OM field must establish how best to measure performance to account for this in order to tame the problems without missing the essence of what needs to be achieved entirely. Conceivably, there is a need to emphasise good enough solutions rather than optimal ones.

Finally, a constant theme from all the empirical chapters was that there is a plethora of decisions and approaches that IHOs take which are difficult to justify or understand at face value. Without dismissing how counterintuitive reality may be, it seems improbable that decision makers make these choices for no good reason. Given the level of uncertainty coupled with repeated exposure to some of the issues that the sector grapples with, it is probable that the level of “knowledge which doesn’t know

itself” is high in this sector (Zizek, 2006). Interrelatedness of factors, decisions, and actions implies a need to work through layers of tacit knowledge to establish the core reasons. As such situations become more commonplace due to the expected surge in crisis situations, it is important to engage in more longitudinal research and also capture more non-OM dimensions that directly impact OM activities and outcomes. Some of those dimensions are captured in this thesis and require further exploration, e.g., government regulations, informal actors, organisational identity, and issues creed over goods. This would also further the objective to learn more generally about contexts like the humanitarian setting.

5.3 Limitations and Future Research

In addition to the limitations of this research, there is a wealth of opportunity to explore knottiness in greater detail from the humanitarian setting. We propose future research avenues based on these.

This dissertation has explored the knotty aspects of the humanitarian contexts but, even though there are lessons to be learned for other crisis situations, we have barely begun to scratch the surface on the intricacies of humanitarian operations. Major changes have shaken the sector multiple times in a mere decade and the OM research community, along with others in HA and other relevant fields, are still playing catch-up. The Arab Spring conflicts and the departure of the US and its allies from Afghanistan are having unforetold consequences that anyone immersed in this area of work shudders to ponder on. There is an absolute need to develop rapid learning and anticipation of future challenges and opportunities (Majewski et al., 2010). Though rooted in the humanitarian setting, all these issues are bound to impact global supply chains and threaten livelihoods across the globe.

This dissertation also isolates different elements that make up knotty contexts and focuses on them individually. In reality, these issues often co-exist. For example, the degree of hostility experienced in conflict environments also depends on the complexity that host national governments can create depending on their willingness and ability to guarantee the safety of aid workers (Larson, 2021). Thus, future research needs to tackle several elements that induce knottiness simultaneously.

The prevailing problem of focusing on the main international organisations in humanitarian operations (Barbelet et al., 2020; Majewsky et al., 2010, Taithe, 2014)

is not addressed in this dissertation, but the importance of doing so is confirmed at least for hostile environments. Recent research has also argued for the importance of local HOs on the back of the COVID-19 pandemic and the antiracism movement (Barbelet et al., 2020; Townsend and MacMahon, 2021). The intersection between humanitarian operations, development work, and sustainability issues are also important topics for future research (Banomyong et al., 2019; Kovacs and Falagara Sigala, 2021). As IHOs increasingly struggle in hostile contexts and weather-related disasters mount, the local capacity to respond and build resilience become crucial. More research on local actors and their role in improving outcomes is needed.

Finally, more can be done to “push the boundaries of the discipline” and have a broader impact in other sectors and areas of knowledge (Altay et al, 2021). Although this research focuses on humanitarian operations, there are multiple other areas where OM can contribute. For example, getting ahead of the OM implications of climate change in all sectors can enable us to prepare as best as we can for the worsening incidence and impact of extreme weather conditions on supply chains and, more importantly, survival (Altay et al., 2021; Larson, 2021).

5.4 Concluding remarks

By exploring the implications of an atypical operational setting for key operations management functions, the empirical work in this dissertation demonstrates two important things. First, it shows why ‘business as usual’ approaches to organising and strategizing in operations management are insufficient for addressing the insurmountable problems encountered in crisis situations. Second, it demonstrates that there are valuable lessons to be learned from the humanitarian sector about grim situations and doing the impossible act of overcoming them. This empirical work predates the COVID-19 pandemic but crucially reveals challenges, approaches, and behaviour that were deemed new when the pandemic struck. Chaos, mayhem, and even damaging stakeholder actions, underlie some of the operations management accomplishments of the humanitarian sector. Thus, much of what we see as the pandemic rages on has always been here. We, as the OM community, just did not pay enough attention to it. For the field to become an undisputed authority on strategic organising for knotty contexts it has yet to learn about both short-term and protracted crises. A trailblazing sector that exists because of, not in spite of, complexities,

extremities, and hostilities brought on by unprecedented crisis events and situations is a good place to start.

A common concern for all sectors at this juncture is that crises that introduce knottiness to their operational environments are, unfortunately, only going to worsen. As we are pushed further to the edge of unprecedentedness and beyond, operations management everywhere should be readying to co-exist with knottiness and to achieve some of the never-seen-before feats in strategic organising. There is a need to constantly contemplate what the future could bring, predict the implications and, where possible, develop remedies, before reality catches up. Our rate of learning needs to catch up to the rapidly unfolding reality. But, this dissertation shows that it is not all doom and gloom.

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SAMENVATTING

Dutch Summary

Internationale humanitaire organisaties (IHO's) opereren niet alleen onder moeilijke omstandigheden, maar vaak ook binnen een heel complexe omgeving. Meerdere kenmerken van de humanitaire context creëren onoverkomelijke obstakels voor IHO's terwijl ze levensreddende hulp proberen te bieden aan mensen in nood. In deze context is er bijvoorbeeld sprake van extreem ontwrichtende gebeurtenissen als gevolg van natuurlijke en door de mens veroorzaakte rampen. Daarnaast hebben IHO's vaak te maken met vijandigheid, omdat conflicten gevaarlijker zijn geworden en vaker voorkomen. Het besef dat de humanitaire context zulke unieke kenmerken heeft, heeft binnen operations management (OM) halverwege het eerste decennium van de eenentwintigste eeuw geleid tot een gerichte onderzoeklijn naar humanitaire operaties. Het is interessant om te zien dat crisissen in verschillende contexten vergelijkbare kenmerken blijken te hebben. Het gevolg is dat onderzoekers steeds meer stellen dat er veel van deze context kan worden geleerd over het uitvoeren van operaties onder onmogelijke omstandigheden. Meer recent hebben onderzoekers een aantal lessen gepresenteerd die kunnen worden geleerd van de humanitaire sector over het omgaan met de COVID-19-pandemie, een unieke crisis in de moderne tijd. Toch is er nog onvoldoende begrip van deze kenmerken en hun implicaties voor operations management. Dit PhD-proefschrift gaat over deze tekortkoming. Met de humanitaire context als onderzoekssetting heb ik onderzoek gedaan naar uitdagingen voor operations management en strategieën voor crisismanagement in het algemeen en voor humanitaire hulp in het bijzonder.

Dit proefschrift onderzoekt de implicaties van een aantal specifieke kenmerken van de humanitaire context (complexiteit, extremiteit en vijandigheid) waardoor deze context heel complex is voor essentiële OM-functies. Drie belangrijke, maar nog niet goed onderzochte fenomenen worden gebruikt als basis om deze implicaties te ontrafelen,

namelijk complexe noodsituaties, gelijktijdige rampen (tegelijk optredende crisissen) en gewapende conflicten.

Complexiteit

Het onderwerp van het eerste onderzoek (hoofdstuk 2) is het fenomeen complexe noodsituaties. Deze worden door de Wereldgezondheidsorganisatie (WHO) gedefinieerd als situaties waarin er sprake is van een ineenstorting van staatsstructuren, omstreden legitimiteit van lokale autoriteiten, schendingen van mensenrechten en eventuele gewapende conflicten. In de meerderheid van de humanitaire crisissen in de wereld is sprake van complexe noodsituaties; natuurrampen vinden steeds vaker plaats in gebieden met complexe noodsituaties, waar ze zich meestal ontwikkelen tot een aanhoudende crisis. Vanwege de politiek geladen aard van complexe noodsituaties reageren de lokale autoriteiten vaak op manieren die de humanitaire hulpoperaties complexer maken.

Het doel van het eerste onderzoek was om inzicht te verkrijgen in het gedrag van lokale autoriteiten ten opzichte van IHO's, welke drijfveren hieraan ten grondslag liggen en de impact hiervan op de humanitaire logistiek. Drie factoren bleken van invloed op het gedrag van de lokale autoriteiten: (i) het spanningsveld tussen de strategische belangen van de autoriteiten en die van IHO's; (ii) de mate waarin autoriteiten afhankelijk zijn van diensten van de IHO's; en (iii) de reglementaire en handhavingsbevoegdheden van de autoriteiten. De redenen voor spanningen tussen de belangen van lokale autoriteiten en die van IHO's variëren van politieke redenen, die bijvoorbeeld kunnen leiden tot beperkte toegang voor IHO's tot gebieden waar gewapende niet-regeringsgroeperingen het voor het zeggen hebben, tot daadwerkelijke hervormingen, zoals het verbeteren van de kwaliteitscontrole, met als gevolg strenge eisen voor hulpgoederen uit internationale bronnen. De mate waarin lokale autoriteiten afhankelijk zijn van IHO's staat in relatie tot de vraag of specifieke IHO-diensten nodig zijn om de belangen van de lokale autoriteiten vooruit te helpen. Op basis van deze drie factoren die van invloed zijn op het gedrag van lokale autoriteiten, zijn vier houdingen van lokale autoriteiten gedefinieerd: niet-restrictief, opportunistisch, selectief meegaand en onverzettelijk. Niet-restrictieve en opportunistische lokale autoriteiten hebben over het algemeen weinig reglementaire en handhavingsbevoegdheden, waardoor eventuele spanningen onzichtbaar zijn. Daar

staat tegenover dat selectief meegaande en onverzettelijke autoriteiten hoog scoren op beide (spanning en bevoegdheden).

De geïdentificeerde houdingen van lokale autoriteiten zijn van invloed op logistieke beslissingen, zoals het nastreven van efficiëntie, het investeren in langetermijnplanning en het ontwikkelen van noodstrategieën voor onvoorziene situaties. In het geval van niet-restrictieve lokale autoriteiten kan de focus het beste liggen op best practices, omdat beslissingen en resultaten vrijwel niet worden beïnvloed door de lokale autoriteiten. Mogelijke overwegingen zijn het zorgvuldig selecteren van distributiekkanalen en transportmethoden en -frequentie, en het tot een minimum beperken van buffervoorraden. In het geval van opportunistische lokale autoriteiten is het belangrijk om rekening te houden met praktijken die tot onzekerheid kunnen leiden en daardoor van invloed kunnen zijn op tijdigheid. Een 'just-in-time'-aanpak werkt waarschijnlijk niet en het is beter om buffers op te bouwen voor eventueel ontwrichtend gedrag van de lokale autoriteiten. Een andere overweging zou kunnen zijn om samenwerkingsverbanden op te zetten met andere internationale actoren om de toegankelijkheid van voorraden te verbeteren, bijvoorbeeld door voorraden in het land zelf te verdelen als de goederen van de IHO worden tegengehouden door de douane. In landen met selectief meegaande lokale autoriteiten is het verstandig om beslissingen vooral te baseren op de beschikbare opties (bijvoorbeeld lange levertijden accepteren en hierop anticiperen) en onderhandelingen te beperken tot zaken die echt belangrijk zijn (bijvoorbeeld uitzonderingen onderhandelen over beperkingen op aantallen om te anticiperen op een onzekere vraag). Te veel contact met de lokale autoriteiten kan van invloed zijn op het vermogen van IHO's om invloed uit te oefenen op andere keuzes van de autoriteiten. Onderhandelingen met onverzettelijke lokale autoriteiten mislukken vaak. Er kan echter een zekere mate van zekerheid worden bereikt als er prioriteit wordt gegeven aan het begrijpen van de regels en deze regels ook worden gevolgd. Dit houdt in dat zowel voorraadbeheer als transport vooruit moet worden gepland. Als lokale autoriteiten de toegang van IHO's beperken tot bepaalde gebieden, kan het een goede strategie zijn om nauw samen te werken met lokale organisaties en hun capaciteit om te reageren uit te bouwen.

Extremiteit

Het tweede onderzoek (hoofdstuk 3) richt zich op gelijktijdige rampen waarbij plotselinge rampen of onverwachte veranderingen optreden tijdens humanitaire operaties. Gelijktijdige rampen zijn crisissen die op hetzelfde moment optreden. Ze komen vaak voor tijdens humanitaire operaties, aangezien natuurrampen de grootste impact hebben in gebieden waar al sprake is van complexe noodsituaties. Ook tegelijk optredende en elkaar beïnvloedende factoren leiden tot overlap in de crisissen waar IHO's op moeten reageren. Deze rampen binnen rampen creëren een extreme situatie voor IHO's die al onder zeer moeilijke omstandigheden werken, omdat ze vaak gepaard gaan met een enorme toename in vraag, in combinatie met beperkte voorraden en transportmogelijkheden.

In het tweede onderzoek is gebruikgemaakt van meerdere methoden om de veerkracht van het leveringsnetwerk in extreme omstandigheden te onderzoeken en meer te weten te komen over veerkracht in het algemeen. Interessant hierbij is (i) de mate waarin plotselinge rampen van ongekende omvang, duur en reikwijdte van invloed zijn op de werking van de leveringsketen; en (ii) hoe IHO's omgaan met de belangrijkste dreigingen die deze rampen vormen voor de continuïteit van voorraden voor lopende operaties. Het onderzoek richt zich op 2010, een van de ergste jaren voor de humanitaire sector wat betreft plotselinge rampen. Voor het onderzoek zijn vier grote rampen geselecteerd die van invloed waren op lopende operaties. In volgorde van timing zijn dit de aardbeving in Haïti (Ha-E), de uitbraak van cholera in Tsjaad (Cha-C), de overstromingen in Pakistan (Pak-F) en de uitbraak van cholera in Haïti (Ha-C). In tegenstelling tot Cha-C was Ha-C totaal niet voorzien, omdat deze uitbraak werd veroorzaakt doordat besmette tenten van een andere humanitaire missie werden ingezet na de aardbeving.

Om (i) te onderzoeken, heb ik een econometrisch onderzoek uitgevoerd naar de impact van grote, plotselinge rampen tijdens lopende humanitaire operaties op lokaal niveau (op de plaats waar de ramp optrad) en op netwerkniveau (de rest van de eindklanten van het netwerk in verschillende landen). De resultaten laten interessante en soms tegenstrijdige effecten zien tussen het knooppunt- en het netwerkniveau tijdens de respons op de gebeurtenissen. Voor wat betreft prestaties: slechter op knooppuntniveau (Haïti), maar beter op netwerkniveau voor Ha-E; beter op zowel knooppuntniveau (Tsjaad) als netwerkniveau voor Cha-C; beter op knooppuntniveau

(Pakistan), maar slechter op netwerkniveau voor Pak-F; en slechter op zowel knooppuntniveau (Haïti) als netwerkniveau voor Ha-C. Uit een kwalitatief follow-uponderzoek blijkt dat deze verschillen kunnen worden verklaard door omgevingsfactoren die het leden van het toeleveringsnetwerk gemakkelijker of juist moeilijker maken om wijzigingen in de operationele omgeving op te vangen. Deze wijzigingen kunnen te maken hebben met het aanbod, de vraag en/of het proces. Verder ontwikkelen leden van het netwerk mechanismen om rollen te specificeren in de bereidheidsfase (roldefinitie, rolduidelijkheid, roltoewijzing en variabele rollen) en de responsfase (roluitvoering, rol(her)toewijzing en rolverkenning). Als het netwerk langdurig te lijden heeft onder extreme omstandigheden, kan dit tot een onvermijdelijke ontwrichtende impact leiden binnen het hele netwerk, omdat sommige leden van het netwerk niet langer afdoende kunnen reageren, terwijl andere leden niet bereid zijn om meer (lange termijn) middelen in te zetten voor een tijdelijke crisis.

De juiste combinatie van rollen om de impact op de prestaties tot een minimum te beperken, is afhankelijk van de voorspelbaarheid van plotselinge gebeurtenissen, de totale impact van deze gebeurtenissen, de duur van deze impact en de faciliterende en remmende omgevingsfactoren. Voorbeelden van deze laatste factoren zijn het uitroepen van de noodtoestand door de autoriteiten van het land in crisis of de beschikbaarheid van alternatieve transportroutes. In het geval van bekende situaties (zoals Cha-C), zorgen rolduidelijkheid en roltoewijzing in de bereidheidsfase en roluitvoering in de responsfase voor optimale veerkracht van het toeleveringsnetwerk. In het geval van onbekende situaties (zoals Ha-C), zorgen variabele rollen in de bereidheidsfase en flexibiliteit in het (opnieuw) toewijzen en onderzoeken van deze of andere rollen in de responsfase voor meer veerkracht in het netwerk.

Vijandigheid

Het derde onderzoek (hoofdstuk 4) definieert de humanitaire ambitie om lijden te verzachten tijdens gewapende conflicten. De conflicten die werden aangewakkerd door de Arabische Lente en de algehele verminderde controle van lokale autoriteiten tijdens politieke crisissen zorgden voor meer uitdagingen voor IHO's op het gebied van veiligheid. Het aantal gerichte aanvallen op hulpverleners is sterk toegenomen (een afspiegeling van de toegenomen vijandigheid ten opzichte van humanitaire organisaties in het algemeen) en vanuit OM-perspectief is er nu een goed inzicht in

hoe hulpverleners met deze realiteit omgaan terwijl ze humanitaire hulpverleners tijdens gewapende conflicten.

Het derde onderzoek maakt ook gebruik van meerdere methoden om de kenmerken van een conflictomgeving te begrijpen die van invloed zijn op operaties en op hoe IHO's de best mogelijke resultaten proberen te bereiken tijdens hun respons. Het onderzoek combineert de perspectieven van humanitaire actie (HA) en operations management (OM) om de modus operandi vast te stellen, oftewel de typische manieren van werken van een IHO vertaald naar strategische overwegingen en de implicaties voor gerealiseerde resultaten. Om deze relaties te onderzoeken, zijn vier grote IHO's met verschillende mandaten en financieringsstructuren geselecteerd.

Om conflicten te karakteriseren, heb ik een *quantitative content analysis* toegepast om de jaarverslagen van deze vier IHO's over een periode van 6 jaar te analyseren. Dit resulteerde in een typologie van conflictomgevingen die is gebaseerd op twee dimensies: hun reikwijdte voor wat betreft de actoren die bij het conflict worden betrokken of er belangen in hebben (lokaal versus internationaal, meestal autoriteiten of gewapende groeperingen), en de dominante kwesties die aan de conflicten ten grondslag liggen (goederen versus geloofsovertuigingen, bijvoorbeeld materiële hulpbronnen, respectievelijk ideologische verschillen). Beide dimensies worden gezien als een continuüm in plaats van strikt categorisch, en leiden tot vier primaire conflictomgevingen: gedomineerd door goederen, lokaal (Go-L); gedomineerd door geloofsovertuigingen, lokaal (C-L); gedomineerd door goederen, internationaal (Go-GI); gedomineerd door geloofsovertuigingen, internationaal (C-GI). De implicaties van het uitvoeren van humanitaire operaties in elk van deze vier omgevingen zijn vervolgens kwantitatief onderzocht. Uit de resultaten blijkt dat, afhankelijk van de identiteit en het mandaat, IHO's de omgeving proberen te beïnvloeden door middel van hervormen (bijvoorbeeld het verbeteren van het respect voor humanitaire actoren in het algemeen om gerichte aanvallen te beperken), vernieuwen (bijvoorbeeld het verbeteren van de effectiviteit van de politie om misdaad te bestrijden) en/of reageren (bijvoorbeeld het initiëren van een respons, zoals het publiekelijk uitspreken tegen de acties van een specifieke regering of gewapende groepering om de omgeving waarin wordt geopereerd snel te verbeteren). Succesvolle pogingen om de omgeving te beïnvloeden leiden tot surplus waar de hele sector van profiteert. IHO's proberen ook elementen van hun modus operandi aan te passen aan verschillende

sourcingstrategieën in verschillende conflictomgevingen. Afhankelijk van in hoeverre ze toegang hebben tot degenen die hulp nodig hebben, kunnen ze insourcen, outsourcen en/of gebruikmaken van perifere facilitering, waarbij ze andere actoren helpen toegang te krijgen tot gebieden waar ze zelf niet kunnen opereren. Elke beslissing omvat inherente compromissen tussen relevante prestatiedoelstellingen, te weten kosten, kwaliteit, snelheid, continuïteit en dekking. Als IHO's insourcen, moeten ze ook beslissingen nemen over de juiste veiligheidsstrategieën.

Vanwege de verschillende compromissen voor elke sourcing- (en veiligheids) strategie in alle conflictomgevingen, is de uiteindelijke sourcingstrategie afhankelijk van wat een IHO het belangrijkste vindt en hoe breed de IHO haar fundamentele waarden interpreteert (bijvoorbeeld 'geen wapens'-beleid) en/of bereid is hierover compromissen te sluiten. Over het algemeen leidt insourcing in lokaal gerichte conflicten (in combinatie met acceptatie en veiligheidsstrategieën) tot meer kwaliteit en snelheid, terwijl outsourcing leidt tot betere continuïteit en dekking. In Go-GI-conflicten worden vergelijkbare resultaten behaald met beide sourcingstrategieën. Het verschil met lokaal-georiënteerde conflicten is dat IHO's bij insourcing meer veiligheidsstrategieën moeten inzetten (bijvoorbeeld acceptatie, bescherming, afschrikking en management op afstand) om de resultaten te verbeteren. In C-GI-conflicten kunnen goede resultaten worden bereikt met insourcing en door dezelfde vier veiligheidsstrategieën te hanteren als in Go-GI-conflicten. Er kunnen echter soms betere resultaten worden behaald met outsourcing, een methode die ook betere continuïteit en dekking biedt. Als geen van beide opties haalbaar is, is perifere facilitering de beste aanpak, maar dit gaat waarschijnlijk ten koste van verantwoordelijkheid, een HA-zorg. De kosten variëren aanzienlijk tussen de verschillende IHO's, afhankelijk van hoeveel ze investeren in veiligheid tijdens het insourcen en in monitoring tijdens het outsourcen.

Conclusie

Dit proefschrift behandelt de kenmerken van de humanitaire context die een grote impact hebben op de OM en daarom in overweging moeten worden genomen bij toekomstig onderzoek. Hoewel dit empirisch werk dateert van voor de COVID-19-pandemie, laat het heel duidelijk zien dat uitdagingen, aanpakken en gedrag die werden gezien als nieuw toen de pandemie begon, altijd al hadden bestaan. De chaos, de puinhoop en zelfs de schadelijke acties door belanghebbenden tijdens de COVID-

19-pandemie liggen aan de basis van een aantal van de prestaties op het gebied van operations management in de humanitaire sector. Daarom biedt dit proefschrift een inkijkje in hoeveel er kan worden geleerd van een sector die bestaat dankzij, en niet ondanks, complexiteiten, extremiteiten en vijandigheden ten opzichte van zijn operationele omgevingen.

Bij het interpreteren van de resultaten van dit proefschrift moeten IHO's zich ervan bewust zijn dat verschillen in mandaten of missies, financieringsstructuren en interpretaties van de humanitaire principes kunnen leiden tot verschillende prioriteiten en uitkomsten. Zo kunnen regels van lokale autoriteiten voor alle bestudeerde fenomenen worden toegepast op individuele basis en worden deze sterk beïnvloed door deze IHO-kenmerken. In extreme situaties kan het evenwicht tussen de bereidheids- en de responsfase ook variëren tussen IHO's. Hoewel de geïdentificeerde mechanismen met betrekking tot de rollen binnen het leveringsnetwerk in alle situaties gelden, leidt de mate waarin individuele IHO-leveringsketens elke fase prioriteren tot verschillende implicaties voor wat betreft de snelheid waarmee verschillende mechanismen moeten worden geactiveerd of gedeactiveerd om de leveringscontinuïteit in gelijktijdige crisissituaties te garanderen. Verder stel ik dat, vanwege de goederen-intensieve aard van OM-gerelateerde aspecten van humanitaire hulp, inzichten uit dit onderzoek ook licht kunnen werpen op bredere uitdagingen in HA. Logistieke beperkingen zijn vaak gerelateerd aan andere kwesties, zoals IHO-registratie, visaprocedures, toegang, enzovoort. Daarom biedt inzicht in hoe en waarom het transport van voorraden wordt beïnvloed mogelijkheden om bepaalde factoren concreter te evalueren die anders moeilijk te bepalen zijn. Dit heeft uiteraard zijn beperkingen, omdat bijvoorbeeld de verplaatsing van mensen en goederen, zoals de onderzoeken 1 en 3 laten zien, een andere dynamiek en andere risico's met zich meebrengen.

Voor wat betreft crisismanagement in het algemeen, is een overkoepelende zorg voor alle sectoren op dit moment dat crisissen die voor complexiteit zorgen in de operationele omgeving helaas altijd zullen verslechteren. Er moet voortdurend worden nagedacht over wat er in de toekomst kan gebeuren, waarbij de implicaties moeten worden voorspeld en, waar nodig, oplossingen moeten worden ontwikkeld voordat ze door de realiteit worden achterhaald. Maar zoals dit proefschrift laat zien, is het niet

alleen maar slecht nieuws. Zelfs onder onmogelijke omstandigheden kan veel worden bereikt.

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My journey starts decades earlier in the streets of Gwabalanda, Bulawayo. There, the adage “it takes a village to raise a child” was epitomised. I was everybody’s child and my teachers declared I was to have an academic career. I had no idea what they were talking about and I behaved as a clueless person would – wasting my little life away and troubling trouble before trouble troubled me. That did not deter them and the rest of the village from keeping me on course and seeing to it that I stayed in school. My parents, however, were larger than the village. They were focused on letting me *learn life* and instilling in me the belief that I could do anything (just not everything). My father’s favourite question was “why?”. He could mull over the smallest of things for hours on end. This drove my mother crazy at times, she was always more interested in “how?”. Her catch phrase was “*nishibwelela kunuma*” (essentially, forward ever, backward never) and she always found a way to keep it moving. At some point – I cannot tell whether by nature or by nurture – I became a cross between my parents: I want to know “why” and also want to know “how”. The result: I drove everybody in the village crazy most of the time. All those people who were changing me and my life’s course one day at a time for more than 20 years will always have a special place in my heart (a special shout out to Phumuzile MaBhebhe and Sithabiso Tshula). I will never see most of them again in this life. But, it is only fitting that I begin by paying tribute to the people of Gwabalanda. I am glad that this is where my journey began.

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