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Cash and Voucher Assistance in Humanitarian Contexts: Supply Chain Determinants for Feasibility and Operability

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and Operability

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Cash and Voucher Assistance in Humanitarian Contexts: Supply Chain Determinants for Feasibility and Operability

Keywords: cash and voucher assistance, humanitarian supply chain management, preparedness, systems thinking

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PREFACE

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ABBREVIATIONS

CALP	The Cash Learning Partnership Network
CVA	Cash and voucher assistance
CWG	Cash working group
DG ECHO	Directorate General for Humanitarian Aid and Civil Protection
FSP	Financial service provider
HSCM	Humanitarian Supply Chain Management
IFRC	International Federation of the Red Cross
KYC	Know your customer
NGO	Non-government organization
PSP	Payment service provider
RCRCM	Red Cross and Red Crescent Movement
SCM	Supply Chain Management
UN	United Nations
UNHCR	United Nations High Commissioner for Refugees
WFP	World Food Programme

1 INTRODUCTION

If you've never been on the receiving end of aid, you are lucky. But, if one day, you are in that position [would] you want other people making choices about what you eat and how you spend your money? (Tshilombo, 2021)

In rural northwest Kenya, a small marketplace unexpectedly buzzes with life as “locals” buy, sell, and trade their wares. Groceries, cookware, clothing, and consumer goods fill the numerous stalls that line the busy roads, alongside internet cafes, bakeries, and beauty salons. At a glance, this marketplace activity might seem relatively normal for the region – but the specific context distinguished it from other markets. It was a marketplace in Kakuma Refugee Camp, and I was witnessing a thriving informal economy sustained by refugees who inhabited the camp from numerous neighbouring countries. At the time, I was a procurement associate on a field training exercise and had recognized goods that our organization had procured for the refugee population – only to be resold in the market. The procurement officer told me that while it is not encouraged to resell relief items, it is also not forbidden because the profits will go toward meeting other basic needs. “For most people,” he said, “cash is king.”

The supply officer then took me to a new settlement, where refugees were building permanent housing units made of stone and mortar, instead of prefabricated housing units made of tarpaulin. Each household was given cash to hire local contractors, pay for materials, and make design choices for their house. The local contractors were other refugees operating under a cash-for-work programme. Materials were sourced from outside the camp, enabling the traders in material and financial flows to go beyond the physical boundaries of the camp, feeding into the growing informal economy in Kakuma. The officer then explained that for the refugees who were unable or unwilling to return to their country of origin, giving them cash and the dignity of choice at least provided some degree of autonomy and control over their situation; a valuable commodity for those who have had to leave everything behind.

This was my first exposure to a cash assistance programme, which left an impression on me about the complexities of providing humanitarian aid, and how different variations of aid may produce different results for organizations, beneficiaries, and local market actors. From this point on, my interest in cash assistance grew over time, evolving from a procurement perspective to an overall supply chain management perspective, until I had the opportunity to explore the topic in depth.

This thesis explores the questions that had arisen in my mind over time, offering a unique perspective on an emerging component of the humanitarian system.

1.1 Growth of cash and voucher assistance

Over the past two decades, the humanitarian sector has witnessed a significant expansion in the use of cash and voucher assistance (CVA) to persons affected by disasters. From 2006 to 2020, the volume of humanitarian aid provided through CVA has grown from roughly US\$ 2 million to US\$ 6.3 billion, accounting for nearly one-fifth (19%) of all international relief (Development Initiatives, 2021). As evidence of the cost-effectiveness and efficiency of CVA has continued to mount, humanitarian organizations including United Nations (UN) agencies, Red Cross and Red Crescent Movement (RCRM) societies, and several non-governmental organizations (NGOs) have begun to institutionalize CVA by further expanding their programmes and routinely considering cash in their planning (Jodar et al., 2020). Quite rapidly, CVA has grown from a rarely used alternative (Peppiat et al., 2001) to the preferred and ‘go-to’ mode of support for humanitarian organizations (Bailey & Harvey, 2017; Lawson-McDowall et al., 2021).

CVA differs from in-kind assistance insofar as persons affected by disasters receive money or vouchers to purchase what they need from local markets, as opposed to goods or services being provided to them through humanitarian organizations. By allowing beneficiaries to prioritize their own needs, CVA offers flexibility and dignity of choice that in-kind assistance does not (Harvey, 2007). Furthermore, CVA promotes economic activity which can positively impact local, regional and national markets in the context of intervention (Bailey & Pongracz, 2015). The injected cash often stays and circulates within local economies, which can boost trade and better support host communities than in-kind assistance (Bailey & Harvey, 2015; Bailey & Pongracz, 2015).

Although the use of CVA has been expanding globally, it should not be thought of as a ‘one-size-fits-all’ solution (Heaslip et al., 2018b, p. 1175; Pellerano & Barca, 2014, p. 13), nor a panacea (Farrington & Slater, 2006; Peppiat et al., 2001) that will cover all needs in all situations. Rather, it is highly context-dependent and may be deployed alongside other modalities to cover a set of needs (Bastagli et al., 2016; Piotrowicz, 2018). Yet, extant research has overwhelmingly focused on analyzing outputs from interventions, rather than antecedents and underlying

supply chain structures necessary for CVA programming to take place (García Castillo, 2021; Heaslip et al., 2018a; Tappis & Doocy, 2018).

1.2 Problem statement

This shift in the way aid is delivered is not without consequence. Both practitioners and researchers have noted the impact it has had on humanitarian supply chain design, the network of actors involved in the delivery of aid, and how risks are managed in operations (Bailey & Harvey, 2015; Heaslip et al., 2016). CVA is not procured, implemented, and managed in the same manner as in-kind assistance (Heaslip et al., 2018a), often requiring separate operational policies for effective programming and risk mitigation (see, for example, Mitchell et al., 2019). CVA also has numerous preconditions which must be met before implementation, such as ensuring markets are functioning properly and safely accessible, with a sufficient supply of goods available (Barrett & Maxwell, 2007).

Even when CVA pre-conditions are met, there are programming-related risks that must be considered. The possibilities of market distortion, hyperinflation, fraud, and diversion of aid require humanitarian organizations to engage in monitoring and evaluation activities to manage risks throughout the entire programming cycle (Gordon, 2015). However, these market assessments and monitoring activities may only track the prices of goods, not necessarily the functionality of the supply chains on which they depend (Byrne et al., 2013; Harvey & Bailey, 2011). Infrastructure, economic factors, and environmental forces all affect market stability, which then can affect commodity prices, availability of goods, and accessibility to markets (Barrett et al., 2009). When supply disruptions occur in humanitarian crises, critical goods may become unavailable and prices may become inflated due to increased demand, which may be coupled with access constraints for those who depend on markets to meet their needs. As humanitarian organizations adhere to the principle of ‘do no harm’, it is essential that vulnerable populations which rely on markets to meet their needs are not exposed to additional risks due to humanitarian interventions (Gordon, 2015). Therefore, if cash assistance or vouchers are to be used, the programmes should be implemented strategically so as not to cause disruptions to the existing supply chains and financial markets which may further exacerbate an unstable situation (Doocy et al., 2016; Harvey, 2007). For humanitarian organizations to effectively respond to crises, with either CVA or in-kind assistance, markets which are critical for affected populations must be

assessed, including how those markets are supplied, and who the key suppliers are in the given environment (Bailey & Harvey, 2015). Thus, there is a need for greater supply chain visibility and transparency, emphasizing the importance of information sharing and knowledge management (Maghsoudi et al., 2021).

CVA then puts greater emphasis on the network of actors, and local actors in particular who may know the local and regional dynamics better than international humanitarian actors (Creti, 2010). Furthermore, local supply chains may already be established, whereas humanitarian supply chains are often only established in response to a disaster (Heaslip et al., 2018a; Piotrowicz, 2018). CVA leverages the infrastructure of existing supply chains to allow beneficiaries to meet their needs, creating additional demand under the assumption that it will be met with increased supply and keeping a portion of the injected money in the local economy (Bailey & Pongracz, 2015; Creti, 2010). The network structures and coordination mechanisms which facilitate the financial and material flows between suppliers and humanitarian organizations need to be understood for effective delivery (Altay & Green, 2006).

The problem grows in complexity as persons affected by disasters often have multiple concurrent needs to be met, with varying degrees of severity and urgency. Each should be evaluated separately to determine the best course of action to take for the response (Barrett et al., 2009; Maxwell et al., 2013; Piotrowicz, 2018). A multi-faceted response may involve multiple supply lines with varying constraints (Balcik et al., 2010). Time and resource constraints will determine the breadth and depth of initial needs and market assessments, which will have a subsequent impact on whether CVA, in-kind aid, and local procurement is perceived to be the most appropriate response for the context (Barrett et al., 2009; Piotrowicz, 2018). This underscores the need for preparedness plans, such as developing local capacities, extant baseline market information, and the incorporation of CVA into emergency response plans to evaluate possible modalities (García Castillo, 2021). This step towards cash preparedness is meant to allow for more agile responses when disasters occur (Jahre, 2017), but other tradeoffs must be considered as well.

As the magnitude and complexity of disasters increase, so too must the variety of response mechanisms and actors involved in delivering aid increase. In cases with multiple needs and objectives, hybrid solutions can be adopted that use multiple modes of assistance alongside one another. To effectively meet these diverse needs in complex settings,

humanitarian organizations must continually adapt and pursue different response combinations, effectively overcoming the variety of challenges with response variety (Ashby, 1956; Boisot & McKelvey, 2011). Other researchers further comment that,

There is huge scope for greater complementarity between cash and sector-specific programming in ways that can create synergistic impacts[...] While the evidence base supports strategic complementarity in programming, the greater evidence challenge lies in more rigorously testing and examining what types and sequencing of interventions work best together, and what combinations of assistance can create synergistic impacts. (Harvey & Pavanello, 2018, p. 6)

The underlying question then shifts towards which combinations of aid can create the greatest effect on affected populations compared to the investment in terms of cost-efficiency, effectiveness, and timeliness (White et al., 2013). For humanitarian organizations, this infers that multiple response options must not only be considered, but integrated into response plans to meet the multitude of challenges and continuous changes in the context.

1.3 Research aim

Given the research problem, the overall aim of this research is to develop a better understanding of how supply chains and networks enable CVA to be efficient and effective interventions across different contexts. To explore this idea, research questions have been formulated from extant research to guide the discourse of this thesis.

First, local market conditions affect CVA feasibility (Frize & Austin, 2021; UNHCR, 2016, 2017). Market assessments are used to determine the availability of goods in the markets and beneficiary access to the markets (Pelly & Juillard, 2018). Markets, in turn, rely on functioning supply chains to provide the necessary goods and services (Heaslip et al., 2018a). However, disasters may disrupt supply chains which may subsequently jeopardize CVA operations. Therefore, the first question posed is,

RQ 1 How does supply chain functionality affect CVA feasibility?

Going further, even when a response involving CVA is deemed feasible, decision-makers must also determine if it is a cost-efficient and effective solution when compared with other forms of delivery (Doocy et al., 2016; García Castillo, 2021; Piotrowicz, 2018). Therefore the second question asks,

RQ 2 What supply-side factors contribute to the relative effectiveness and cost-efficiency of CVA programmes?

While evidence has shown that CVA can be more cost-efficient and effective than in-kind aid, it must be safe and appropriate for the context (Tappis & Doocy, 2018). Harvey et al. (2010) note that risks associated with CVA are not necessarily more or less severe than those associated with in-kind aid, but are fundamentally different because of the change in the *commodity* which is being delivered. Considering the presuppositions for RQ1, and further acknowledging that disasters and unexpected events have the ability to disrupt supply chains which, in turn, can affect market functionality and availability of goods in markets during CVA operations (Heaslip et al., 2018b; Piotrowicz, 2018), then the third research question asks,

RQ 3 How do risks presented by the external environment in humanitarian contexts affect supply chains critical for CVA operability?

If risks are identified, then humanitarian organizations may be more resilient and responsive in the face of supply disruptions through enhanced preparedness measures (Jahre, 2017). However, despite the humanitarian sector's calls for greater CVA preparedness (e.g., Spencer et al., 2016) the concept is vague and ill-defined. The fourth research question then seeks to understand,

RQ 4 How can humanitarian organizations better prepare for CVA programming?

To answer these research questions, a series of studies was conducted, each with specific research objectives to generate findings directed to the overall aim of this thesis. Article #1 primarily addresses RQ1 and RQ2 through a systematic literature review investigating the theoretical relationships between supply chains and CVA in humanitarian contexts, exploring context-specific factors that influence which modes of aid are viable, feasible, and efficient. Article #2 builds upon the findings of Article #1 and addresses RQ3 to investigate how humanitarian organizations adapt their delivery strategy to cope with environmental factors and contextual uncertainties through a case study using system dynamics. Following this, Article #3 then addresses RQ4 by exploring how humanitarian organizations can increase their response flexibility for CVA programmes by investing in preparedness measures.

1.4 Research motivation

This research is motivated by my educational background in industrial and systems engineering, my past experiences working in the humanitarian sector, and the desire for my work to be rooted in the social and common good. Early in my career, I encountered projects in which systems engineering and management principles were adapted and applied in non-traditional settings, such as the public sector. I was greatly interested in the idea that these systems were not driven by profit, but rather operated with limited resources and were governed by laws and regulations which influenced the behaviour of the system. Furthermore, the fact that operational improvements could create a large social impact prompted me to write my master's thesis on the use of simulation techniques for social service organizations to increase client throughput and improve efficiency. The work was nominated for the INFORMS *Doing Good with Good OR Student Paper Competition*, which placed second in 2012. This is mentioned because it exposed me to the INFORMS Special Issue on "Doing Good with Good OR" (Ergun et al., 2011), which was highly influential to me and opened my eyes to researchers who were investigating the very types of problems which were of interest to me.

In the years that followed, I had the opportunity to gain experience in the humanitarian sector, concentrating on procurement and supply operations. In those roles, I became more aware of how humanitarian organizations perceived value for money in their operations and how the context influenced the measure of value. This contrasted with the concept of value I had been taught in systems engineering, involving any activity that contributes to the final product or service that the customer was willing to pay for (Rother & Shook, 2003). In my first encounter with CVA, I saw the fundamentally different approach it took and how it aligned more with the latter concept of value that I had learned by giving power to beneficiaries. As I grew more interested in this topic, professors Graham Heaslip, Gyöngyi Kovács, and Ira Haavisto published a seminal paper (Heaslip et al., 2018a) which explicitly addressed how cash-based responses impacted the logistics activities of humanitarian operations. Their research guided me to Hanken, and the publication provided the academic foundation upon which this thesis is built.

1.5 Research scope

This thesis primarily deals with the logistical and supply chain-related elements associated with delivering cash or vouchers in humanitarian contexts. Thus, this research positions itself at the intersection of two broad research disciplines, *logistics and supply chain management* and *disaster management and humanitarian assistance*. Within these large disciplines exist sub-disciplines of *humanitarian supply chain management* and *cash and voucher assistance*, respectively, where this research is applied. The relative position of this thesis and the general relationship between these concepts are illustrated in Figure 1.

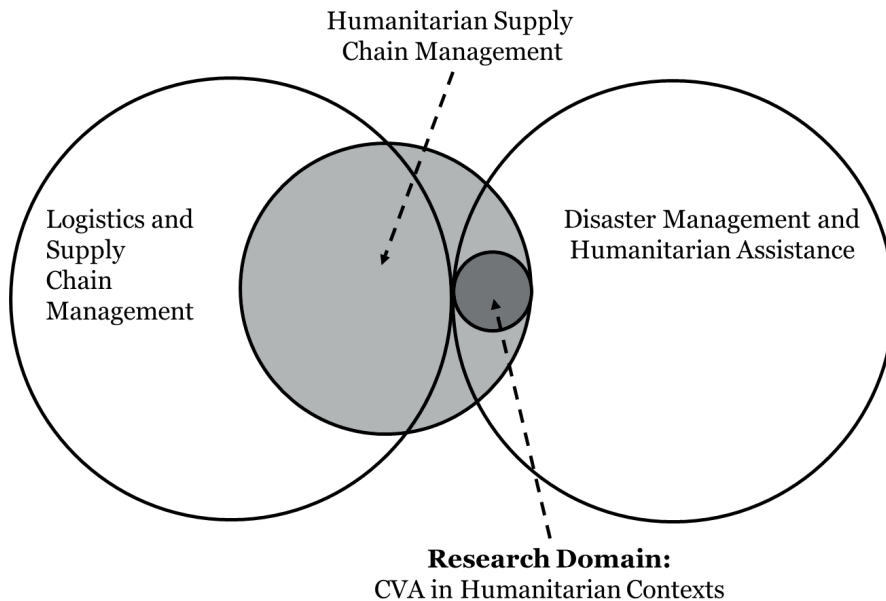


Figure 1: Research positioning for this thesis at the intersection of key disciplines.

1.5.1 Thesis research domain

At the intersection of *logistics and supply chain management* (SCM) and *disaster management and humanitarian assistance* is a unique field called humanitarian supply chain management (HSCM), which is the primary research domain for this thesis. Unlike commercial logistics and SCM, the unpredictable nature of disasters and uncertainty faced by decision-makers in humanitarian operations leads to different challenges in demand fulfilment, inventory management, lead times, and last-mile

delivery (Beamon, 2004). A further distinction is the number and type of actors involved in humanitarian supply networks, whose roles, objectives, and links to other actors are not always clear and aligned with one another (Kovács & Spens, 2007b).

A similar dilemma exists in the *disaster management and humanitarian assistance* discipline, encompassing two distinct concepts: development aid and humanitarian relief. The two are linked by their overarching objectives rooted in humanitarian principles but differ in their range of needs, funding, and duration (Hinds, 2015). While humanitarian relief is generally short-term and used in response to disasters, development aid has a longer duration and aims to reduce poverty and improve livelihoods (Suhrke & Ofstad, 2005). Although the two are closely related, this research focuses primarily on the humanitarian applications of CVA.

This thesis contributes primarily to the discourse on CVA within the HSCM field by drawing on extant SCM theory and applying it to the humanitarian context. Therefore, the major theoretical implications for this research are found within the HSCM field, while the practical contributions may extend into the larger disaster management and humanitarian assistance discipline as well.

1.5.2 A note on terminology

In this research, CVA and HSCM are core terms which are used extensively, therefore it is important to properly define these concepts. The term *CVA* refers to programs which provide cash and/or vouchers to persons affected by crises as a form of relief. Recipients are targeted and aid may be distributed to individuals or households, depending on the donor and distributing organization. As noted in Article #1, given the breadth of CVA applications and purposes, the terminology is not unified across disciplines. For this research, CVA is inclusive of other synonymous terms, such as cash-based assistance (CBA), cash-based responses (CBR), cash-based interventions (CBIs), cash transfer programming (CTP), and market-based programs (MBP). All of these have been used in supporting literature for this research, often interchangeably. The term CVA has been adopted for this research for two reasons:

1. *it is inclusive of voucher programmes as well as cash assistance, and*
2. *it is the term used by the majority of practitioners and promoted by the CALP Network (CALP, 2018).*

Regarding the use of *humanitarian supply chain management*, this thesis applies a ‘unionist’ approach in that *logistics* is considered to be a part of *supply chain management* (Larson & Halldorsson, 2004, p. 20). While the two disciplines may represent conceptually different activities (e.g., Howden, 2009), it must be noted that they are often used interchangeably in research, depending on the author’s epistemological stance (Overstreet et al., 2011). Therefore, this research recognizes that logistical activities are an integral part of managing humanitarian supply chains and adopts a unionist lens to cover both disciplines under the singular term *HSCM*.

Furthermore, this research discusses both humanitarian supply networks and humanitarian supply chains, recognizing that while the two concepts are related and can overlap, each has a distinct meaning for this research with respect to the humanitarian aid system. Beginning with the humanitarian system, Clarke et al. (2018) define it as “a network of inter-connected institutional and operational entities that receive funds, directly or indirectly from public donors and private sources, to enhance, support or substitute for in-country responses in the provision of humanitarian assistance and protection to a population in crisis” (p. 32). The direct and indirect relationships formed between these entities for the provision of aid make up the structure of the *supply network* (Tatham & Kovacs, 2007), while a *supply chain* is a specific instance of linked nodes related to a good or service (Braziotis et al., 2013). The entities in the system consist of individuals and groups of humanitarian actors and stakeholders operating under a broad set of common goals and principles (Taylor et al., 2012). The difference between humanitarian actors and stakeholders is that the former are primarily involved with the delivery of aid, whereas the latter have less involvement but still influence, or are influenced by, the provision of aid (Heaslip et al., 2012; Tatham & Kovács, 2007). Although this research primarily focuses on the actors directly involved in delivering aid, it does not ignore the impact that stakeholders have on humanitarian responses

1.6 Delimitations

This research has four primary delimitations which set the theoretical boundaries of the study. These arise implicitly when the scope of the research is established and are also explicitly set by the researcher to narrow the focus of a study (Simon & Goes, 2018). The decision to include or exclude characteristics of the research ultimately influences the processes and outcomes of the research, therefore they must be stated for a logical argument to be made.

The first delimitation of all research is the *choice* of the research problem (Patton, 2014; Simon & Goes, 2018), noting that other problems often exist in the same domain which may be similar, relevant, or have interdependencies on the studied phenomenon. This specific problem was chosen because of the researcher's interest in the ongoing development of CVA, combined with the researcher's own experiences in the humanitarian sector and educational background in industrial and systems engineering. CVA presents a unique opportunity to study how the process of delivering aid can impact the whole humanitarian system, which the researcher is motivated to investigate.

Second, a design decision was made to only focus on disaster and humanitarian relief applications of CVA and exclude applications related to developmentalism. While the two share several similarities and the amount of research concerning CVA conducted in the developmental sector is rich (e.g., Bastagli et al., 2016), disaster response and relief efforts face considerably different constraints and challenges. The uncertainties faced by humanitarian organizations in the wake of disasters influence their decision-making, including whether to use CVA, when it should be used, and how it should be implemented. Preparing for and responding to disasters is operationally different from developmentalism, including the intended outcomes and potential tradeoffs which are considered. Therefore, the focus of this thesis is on humanitarian relief as opposed to developmentalism.

The third delimitation relates to CVA as a concept. The term is inclusive of analogue and digital modes of providing cash and vouchers and their numerous delivery mechanisms (see Table 1 of Article #3). It however excludes remittances and microfinance loans, which are generally used for developmental purposes. Only transfers to persons and populations are included in this concept, not transfers to governments.

Finally, this thesis predominantly covers the period in which CVA grew and expanded the most across the humanitarian sector, from 2004 onward (Jodar et al., 2020). Notably, it was the 2004 Indian Ocean tsunami response which demonstrated how CVA could be used at scale, leading to more attention and research devoted to the effects of CVA (Heaslip et al., 2016; ODI, 2015). As such, more information became available and marked the starting point for this research.

1.7 Structure of thesis

This composite thesis consists of two primary parts, the *kappa* and a series of published manuscripts investigating the research problem. The *kappa* consists of five sections which summarize the components of the research and link the individual manuscripts to the overarching research problem. The first section introduces the research problem, objectives, key concepts, scope, and delimitations of the study. The second section provides a review of relevant literature related to the scope of the research to ground the research problem within its context. The third section describes the research methodology, including the paradigm, approach, and design used to investigate the research problem. The fourth section presents the key findings from the series of published manuscripts and their relevance to the research problem. The final section discusses the contributions of the research, its limitations, and its implications for practice and theory.

The three published manuscripts follow the *kappa* section of this thesis and are ordered as follows.

Article #1

Maghsoudi, A., Harpring, R., Piotrowicz, W. D., & Heaslip, G. (2021). Cash and Voucher Assistance along Humanitarian Supply Chains: A Literature Review and Directions for Future Research. *Disasters*, 47, 42–77. <https://doi.org/10.1111/disa.12520>

Article #2

Harpring, R., Maghsoudi, A., Fikar, C., Piotrowicz, W. D., & Heaslip, G. (2021). An analysis of compounding factors of epidemics in complex emergencies: a system dynamics approach. *Journal of Humanitarian Logistics and Supply Chain Management*, 11(2), 198–226. <https://doi.org/10.1108/JHLSCM-07-2020-0063>

Article #3

Harpring, R. (2023). Preparing for Cash and Voucher Assistance - Developing Capabilities and Building Capacities. In G. Heaslip & P. Tatham (Eds.), *Humanitarian Logistics* (pp. 217–246). Kogan Page.

2 CORE CONCEPTS OF CASH AND VOUCHER ASSISTANCE IN HUMANITARIAN RESPONSES

When we design for change and we appreciate the systems that sustain wellbeing we inevitably fall in love with the problems instead of the solutions. This unlocks our ability to give people the [change] they need and deserve instead of the incremental innovations we are comfortable producing. (Baizan, 2022)

The purpose of this section is to present the core theoretical concepts which underpin this thesis. As mentioned in Section 1.5.1, the research domain is at the intersection of two smaller research fields (*CVA* and *HSCM*), positioned between two larger disciplines (*disaster management and humanitarian assistance* and *SCM*). The relationship between these disciplines is explored to situate the research questions in the proper context. Therefore, this section expands upon *CVA* as a concept in the humanitarian aid system, the impact it has on humanitarian supply chains, and how that impact is measured.

2.1 What is cash and voucher assistance?

This thesis adopts the CALP Network's definition of *CVA* as it is one of the most used definitions and is supported by over 90 humanitarian organizations, including UN agencies, donors, and non-governmental organizations (NGOs). Thus, *CVA* refers to,

...all programs where cash transfers or vouchers for goods or services are directly provided to recipients. In the context of humanitarian assistance, the term is used to refer to the provision of cash transfers or vouchers given to individuals, household or community recipients; not to governments or other state actors. (CALP, 2018)

In humanitarian relief, *CVA* is a means to meet a set of identified needs within an affected population. Assistance is not sector-specific and often covers needs related to food (Gentilini, 2007), water, sanitation, and hygiene (WASH) products (Martin-Simpson et al., 2018), shelter materials (Matopoulos et al., 2014), health services and nutrition (Owusu-Addo et al., 2018), and education (Baird et al., 2014). Additionally, *CVA* requires collaboration between multiple functions within organizations, such as supply chain, finance, IT, human resources, and management (CALP Network, 2018).

Recipients of *CVA* are determined by humanitarian actors through a targeting process that identifies individuals, households, and groups of

people in the affected population who meet certain criteria to receive aid. The transfer amount and frequency are primarily dependent upon the number and type of identified needs and the local market situation.

After a target population has been identified, CVA may also be subject to conditions for the reception of aid and restrictions related to how the aid is to be used. Conditions and restrictions are often aligned with objectives established by donors or humanitarian organizations, offering a greater degree of control for the benefactors, but reduced flexibility for the beneficiaries. This tradeoff is further described in Figure 1 of Article #3.

Both cash and vouchers can be provided to beneficiaries in various analogue and digital forms, such as mobile money, e-vouchers, pre-paid cards, and physical cash, as shown in Table 1 of Article #3. Vouchers are more restrictive as they can only be redeemed for specific items or services, but can be used strategically to avoid liquidity and inflation issues or to cover a specific need in a population. For both types, the innovation and digitalization of money transfer programmes have allowed CVA to be used more quickly and at larger scales than ever before (Jodar et al., 2020).

Several factors determine which delivery mechanism is used to distribute aid, such as donor regulations, beneficiary preference, financial service provider capacities, and the local context. These factors are weighed during the *response analysis* phase of the humanitarian operations cycle, which is informed by the *situational analysis* and determines the potential courses of action that humanitarian organizations can take (Maxwell et al., 2013). If multiple response modes are possible (i.e., through cash, vouchers, or in-kind), then humanitarian organizations must determine which is the best fit to meet the needs of the affected population.

2.2 When should cash and voucher assistance be used?

CVA can be used during any stage of a disaster, from mitigation to recovery. The form it takes, and the actions involved depend on the disaster phase, context, and type of event. Furthermore, CVA has its own operations cycle (see Figure 3 of Article #3), which relates to the planning, analysis, design, implementation, monitoring, and evaluation of programmes. The phases in the CVA operations cycle are time and context-dependent, so the timing for each activity at each operational phase will have an impact on the outcomes of the response (García Castillo, 2021). Table 1 highlights some of the common uses of CVA

at each stage of the disaster management cycle, though this is also continuously expanding as practitioners and researchers expand the evidence base. Although CVA can be used at any stage of a disaster, strategic planning must guide the response to achieve the desired outcomes. Article #3 covers this topic in greater detail.

Table 1 - Uses of CVA at each stage of the disaster management cycle.

Phase	Purpose	Example Actions
<i>Mitigation</i>	To reduce risk and develop preventative mechanisms for sectors vulnerable to disruptions	<ul style="list-style-type: none"> - Integrate CVA into early action and disaster risk-reduction plans - Use CVA programmes for development and to build up infrastructure
<i>Preparedness</i>	To develop contingency plans and capacities for rapid deployment of CVA in the event of an emergency	<ul style="list-style-type: none"> - Conduct baseline evaluations of markets and supply chains - Establish framework agreement contracts with financial service providers - Integrate CVA responses into local emergency contingency plans
<i>Response</i>	To meet immediate needs following a disaster	<ul style="list-style-type: none"> - Multi-purpose cash grants to affected populations to meet their basic needs - CVA for displaced populations within a host community
<i>Recovery</i>	To help re-establish livelihoods	<ul style="list-style-type: none"> - Cash transfers for long-term recovery from natural disasters - Cash-for-work programmes to help re-establish livelihoods - Post-conflict economic support to households

CVA is most commonly used during the response and recovery phases of a disaster (see Figure 3 of Article #1), but the timing of when they can be used in those phases is variable. CVA takes time to implement and scale up while markets may also go through a period of volatility in the immediate aftermath of a disaster before stabilizing. Therefore, to provide the most timely response, in-kind assistance may be preferred to CVA immediately following a disaster (Piotrowicz, 2018). This depends on the level of preparedness and mitigation measures that have been developed in the local context, which affect the rapidity and the impact of the response (Puri et al., 2017). Regardless, the objective is to match the best response option with the needs of the affected population.

For CVA to be considered as a response option, it must be feasible and appropriate. Numerous decision trees and guides exist to help

practitioners determine whether CVA can be used, which considers market functionality, cultural considerations, and beneficiary safety and security. Figure 2 provides an example of a decision support tool for CVA. Most decision trees act as a quick risk mitigation tool insofar that if a potential response jeopardizes the ‘do no harm’ principle, then it should not be considered until the situation improves and the response options can be reassessed.

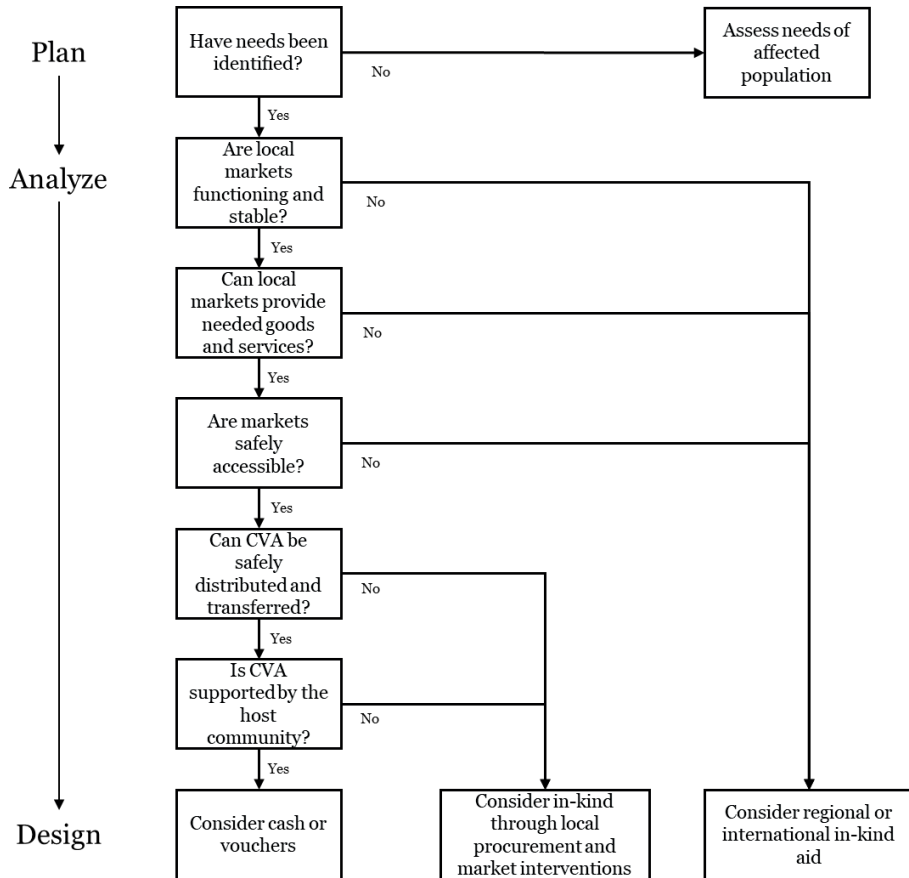


Figure 2: Rapid CVA decision tree, adapted from (DG ECHO, 2013; Falagara Sigala & Toyasaki, 2018).

2.3 How did CVA grow into a major form of humanitarian assistance?

The rise of CVA over the past two decades would seemingly suggest that it is a new concept adopted by the humanitarian sector. That is not the case, however, as cash and vouchers have been used to provide relief following disasters for over 200 years. While the exact origins of using cash assistance in humanitarian contexts are not known, research indicates that it dates back to at least the 19th century, alongside the development of modern humanitarianism, which itself was born out of the long-present concepts of charity, philanthropy, and compassion (Barnett, 2011). Prior to that, the promotion of human welfare through the act of giving (e.g., donations, alms, and social support) is evident in ancient and classical philosophies, religious texts, and cultural traditions – but remained a largely private affair (Bremner, 1996). Ideas stemming from the Enlightenment period led to governments and organizations adopting a more systematic approach to the governance of aid (Barnett, 2011), including where it should be sourced from, who the recipients should be, how it should be used, and which form it should take – including cash and vouchers. As the world became increasingly globalized following the Second World War, greater international attention was given to humanitarian crises, investigating how to prevent disasters and how to respond to them.

It was not until the 1970s that key research on the use of cash and vouchers for humanitarian purposes came to light. Amartya Sen posited that *lack of access to food* and *diminished purchasing power* were primary drivers of food insecurity, rather than the actual *availability* of food (Sen, 1981). This was contrary to popular belief, which held that famine was a result of supply failure or shortage. In his argument, he noted that areas affected by famines usually did not lack a supply of food, but rather that certain populations did not have the means to access and acquire the food supplies. Droughts, floods, and other natural disasters often diminished populations' livelihoods and sources of income, which led to mass starvation. Therefore, the appropriate response should be demand-driven to meet the available supply through the distribution of cash to persons who lacked purchasing power (Sen, 1983). In this way, the markets themselves would remain the primary source of subsistence for the affected populations, as opposed to food aid from humanitarian organizations.

Sen's work began a larger debate on the effectiveness of cash and voucher-based assistance versus in-kind assistance (Bigman, 1985;

Devereux, 1988; Drèze & Sen, 1991; Gentilini, 2007; Huddleston, 1983). Through various pilot studies and interventions, humanitarian organizations were able to conduct cost analyses to compare CVA to other known alternatives in humanitarian contexts. The findings prompted additional cash and voucher-based responses to be used in similar situations, which generated additional evidence for the cost-effectiveness and efficiency of CVA for disaster relief. Simultaneously, a number of development programmes began in the 1970s and 1980s which used cash transfers to improve the livelihoods of persons living in poverty. Although these programmes differed from those which used CVA for disaster relief, they were influential in this period for demonstrating that cash can be used in a wide variety of contexts, that impoverished populations could handle money responsibly, that local economies benefited from injections of cash into the local population, and cash could be more efficient and effective than the delivery of goods and services (Bastagli et al., 2016). Furthermore, researchers noted that communities with built-in safety-net programmes were better equipped to absorb economic shocks following disasters (Skoufias, 2003). Often, the most vulnerable groups in societies are most susceptible to the disruptive effects stemming from disasters. Thus, it was suggested that CVA could be used both as an *ex-ante* and *ex-post* strategy for disaster mitigation and relief, further reducing the theoretical gap between development aid and disaster relief (e.g., Devereux, 2001b).

As the evidence base continued to build for CVA, a watershed moment occurred in 2004 during the response to the Indian Ocean tsunami in Indonesia. The unprecedented amount of international donations (USD 13.5 billion) and the presence of over 180 NGOs and aid agencies led to a large number of CVA pilot programmes designed to cover multiple needs such as food, shelter, and healthcare (Barnett, 2011; Telford & Cosgrave, 2007). In the humanitarian sector, this moment was a turning point for CVA, as it became recognized as an acceptable form of relief in large-scale operations and not confined only to small and controlled contexts (Heaslip et al., 2016; ODI, 2015). This thesis predominantly covers the period in which CVA grew and expanded the most across the humanitarian sector, from 2006 onward (Jodar et al., 2020). Following the Indian Ocean tsunami response, researchers also began to note the implications of CVA for humanitarian logistics and supply chain management, coinciding with the period investigated in Article #1 and a starting point for this research.

Finally, since the Indian Ocean tsunami in 2006, there are three notable factors which have contributed to the continual growth of CVA in recent years. First, technological advancements have greatly improved the tracking and tracing of how cash and vouchers are distributed and spent, leading to greater transparency for donors and contributing to the broader use of CVA (Burton, 2020). Second, global cash coordination measures such as the Grand Bargain are increasing across the humanitarian aid system, which seeks to align the programming efforts by UN agencies and NGOs alike and reduce the duplication of aid (Metcalf-Hough et al., 2021). Third, COVID-19 has changed how humanitarian organizations design and distribute aid, leading to an increased focus on CVA capacity and preparedness efforts (Harpring, 2022) and innovative methods to support markets amid restrictive social distancing measures (Mohamadi et al., 2022). Looking forward, CVA is projected to continue expanding across the humanitarian sector, along with the challenges faced by the responding organizations.

2.4 Why use CVA?

Both CVA and in-kind assistance have advantages and risks that must be evaluated before being implemented. Numerous studies have been conducted from the organizational perspective to compare the benefits and risks of CVA against in-kind aid (Gordon, 2015; Harvey & Bailey, 2011; Peppiat et al., 2001), the developmental and social outcomes following CVA interventions (Bastagli et al., 2016; Doocy & Tappis, 2017), and also the cost differences between modalities (Aker, 2017; Hidrobo et al., 2014; Lentz et al., 2013; Tappis & Doocy, 2018). On the socio-economic side, beneficiaries that receive cash are empowered to prioritize their own needs and make preference-based purchases, as opposed to in-kind aid, which is determined by the donor or humanitarian organization (Heaslip et al., 2018a; Lewin et al., 2018; Piotrowicz, 2018). CVA has been noted to enhance purchasing power and offer greater flexibility of choice to beneficiaries (Harvey & Bailey, 2011) and may boost economic activity and trigger a multiplier effect in local markets (Bailey & Pongracz, 2015).

On the transactional side, the logistics costs associated with in-kind aid can account for a substantial portion of the total cost in disaster relief situations (Hein et al., 2020). Therefore one of the often-cited benefits of CVA is the potential for greater cost-efficiency through the reduction in logistical costs, such as warehousing, customs clearance, and transportation (Heaslip et al., 2018a; Margolies & Hoddinott, 2015;

Tappis & Doocy, 2018). However, as García Castillo (2021) notes, cost-efficiency is time-dependent and subject to market conditions in the area of implementation as well as inflation of prices for identified needs, not just inflation of the local currency. Changes in market conditions during responses may lead to more favourable conditions for other modalities, creating a tradeoff between timeliness and cost-effectiveness (Lentz et al., 2013) and programme effectiveness (Doocy & Tappis, 2017). Thus, while there are well-documented benefits of CVA, there are also unintended consequences and risks which must be consistently and periodically weighed as well.

2.4.1 Risks

The perceived risks associated with transferring money in humanitarian contexts are often a barrier to its utilization and expansion (Mitchell et al., 2019), even though research has indicated they are not greater than the risks posed by other modalities (Idris, 2017). The majority of humanitarian actors still approach CVA with a sense of risk aversion and mitigation, especially to comply with anti-money laundering and counter-terrorism financing rules and regulations (Jodar et al., 2020). Risk mitigation measures are still being developed and refined with the help of donors and financial service providers who have a mutual interest in ensuring funds go to their intended destination (Mitchell et al., 2019). These concerns may be limiting the expansion of CVA programmes, as humanitarian organizations opt for trackable and traceable cash transfers, but not necessarily for in-kind aid (Gordon, 2015).

Risks associated with CVA can be largely categorized into two areas: risks to the operation and risks to the beneficiary. Operational risks include misuse of funds, corruption, diversion of aid, inflation, liquidity concerns in remote areas, technological issues, loss or compromise of beneficiary data, and security at distribution points (Gordon, 2015; Peppiat et al., 2001). Beneficiary-related risks include any potential compromise to their safety, security, and well-being. These include the risk of theft, lack of market access, lack of availability of goods in the marketplace, and financial and technological literacy constraints. Additionally, there are less visible, socially constructed risks associated with power structures separating the beneficiary and the benefactor (Vogel et al., 2022), which produce unintended long-term consequences which are not yet fully understood. This is not a comprehensive list of the risks but highlights some of the major risks perceived by humanitarian organizations (Jodar et al., 2020). Risks vary by delivery mechanism and context, which underscores the need for comprehensive risk mitigation measures throughout the programming cycle.

2.5 How is CVA measured?

In the humanitarian sector, a standardized procedure for measuring CVA programmes does not exist (Tappis & Doocy, 2018). Within the literature, the most common measures used are timeliness, cost-efficiency, and effectiveness, though organizations use different metrics and methods to gather this information (see Section 3.2.4 of Article #1). For this study, the following framework in Figure 3 has been adopted to distinguish between the various metrics.

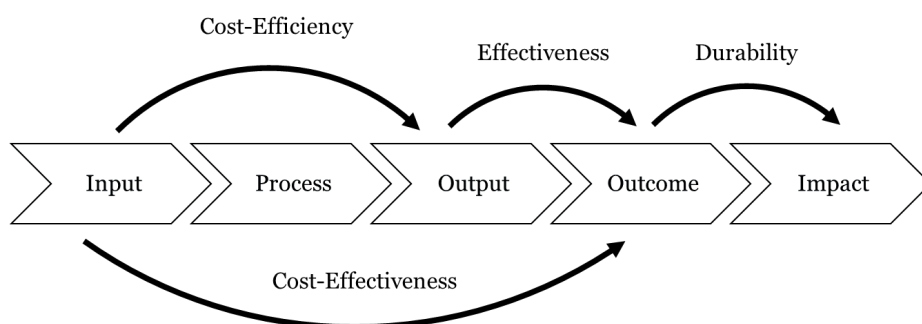


Figure 3: Framework for efficiency and effectiveness measures; adapted from DFID (2011) and ICAI (2017).

The framework above represents an extended input-process-output model used to distinguish between different types of results stemming from an intervention (DFID, 2011), such as short-term versus long-term and intended versus unintended consequences. Within this framework, inputs are the resources used or expended to activate a system or process, which produces a deliverable result or state (i.e., output). How the outputs are used by the target population produces outcomes, which are often measured against programme objectives. This can include unintended or uncontrollable consequences as well, with positive and negative effects (ICAI, 2017). The impact refers to long-term change resulting from an intervention, which may align with a broader set of goals, such as the SDGs. An example is provided in Table 2 below.

Table 2: Definitions and examples of framework components, derived from ICAI (2017).

	Input	Process	Output	Outcome	Impact
<i>Definition</i>	Resources to activate a process	How inputs are used to generate outputs	Deliverable results from the process	Effect of output utilization	Long-term change / transformation
<i>CVA-related example</i>	Financial and human resources	Design and implement programme	Beneficiaries receive cash assistance	Beneficiaries cover their basic needs	Livelihoods restored

This framework includes four performance measures, shown in Table 3. Cost-efficiency refers to the conversion of financial inputs to outputs. For CVA, it is generally the relationship between the overall cost of a programme against the net amount received by the beneficiaries. Laws and Valters (2021) comment that the general efficiency of a solution may include components of time and quality as well, whereas cost-efficiency is narrowed to cost-related components only. Programme effectiveness then refers to how well the outputs are used to meet the needs, whereas cost-effectiveness measures how well the costs are used to meet the needs of the beneficiaries and objectives of the program. Durability refers to how sustainable interventions are and the transferability of outcomes to long-term impacts.

Table 3: Definitions and examples of measures, derived from ICAI (2017).

	Cost-Efficiency	Effectiveness	Cost-Effectiveness	Durability
<i>Definition</i>	How well cost-related inputs are converted to outputs	How well outputs are achieving the intended effect	How well cost-related inputs are converted to outcomes	The sustainability of solutions to achieve long-term impacts
<i>CVA-related example</i>	\$0.90 per dollar transferred directly to beneficiaries	35% reduction in food insecurity in targeted area after transfers complete	Per dollar transferred higher nutritional intake per person than in-kind aid	Improved food security, and reduction in hunger (SDG #2)

There are inherent limitations and biases associated with this model as it developed from the humanitarian organization's perspective and aligned with their objectives and goals. Thus, they will ultimately be

the ones evaluating whether money is used efficiently or effectively, and whether or not it is in line with the will of the beneficiaries (Laws & Valters, 2021; Lewin et al., 2018). Cost-efficiency and cost-effectiveness both require consideration of the total cost of ownership throughout the operational cycle, which may differ from the initial inputs required to initiate a programme (White et al., 2013). Furthermore, the two measures should not be assumed to be indicative of one another. For instance, an option which is not the most cost-efficient may still produce a satisfactory cost-effective solution. Inversely, the most cost-efficient option may not be appropriate for the context if it is not utilized by the target population. For example, if a humanitarian organization would like to give cash for mosquito nets in a culture where mosquito nets are not typically used, there may be a disagreement between perceived values. The beneficiary may perceive the mosquito net to have little-to-no value, while the humanitarian organization may see it as a priority to mitigate the risk of mosquito-borne disease (Kramer et al., 2017). In such a case, beneficiaries may spend the money on other needs they perceive to be greater, while the humanitarian organization may consider the project to have low cost-effectiveness if the cultural context is not considered. Hence, interpreting the values of these measures requires a holistic perspective which considers other internal and external forces which affect the results.

2.6 CVA as a component of the humanitarian aid system

Humanitarian organizations often work in uncertain and rapidly changing environments (Van Wassenhove, 2006) characterized by numerous actors with varying objectives (Jahre et al., 2009; Kovács & Spens, 2007b) and dynamic factors which create complex feedback loops (Gonçalves, 2011). These variables and their interrelations ultimately affect humanitarian performance, making it difficult to measure results across organizations in a standardized manner (Paciarotti et al., 2021). One proposition is to approach humanitarian aid as a system to acknowledge the various goals, internal dynamics, and external environment as factors which affect how responses are designed and delivered (Fawcett & Fawcett, 2013).

From a systems perspective, it is possible to explore how organizations react and adapt in complex environments (i.e., their behaviour) to deliver appropriate responses (Day, 2014; Schiffing et al., 2020), including CVA. According to Seybolt (2009), humanitarian systems are ‘open’ complex systems, meaning that their internal environment, structures, processes, and outcomes are influenced by exogenous factors. Furthermore, these

systems are governed by a network of actors who interact, compete, and cooperate with one another. As noted by Heaslip et al. (2018a), the switch from in-kind aid to CVA implies a reconfiguration of the supply chain (see Figure 2 of Article #3), including different actors, altered material, financial, and information flows, and different supply chain strategies (see Section 3.2.1 of Article #1). Therefore, these changes to the internal composition of the system expand the theoretical boundaries of the system, meaning that it will behave differently to the exogenous pressures exerted upon it. For this reason, it is appropriate to view CVA as a component of the humanitarian aid system to observe its potential impact.

The following section compliments this holistic approach to CVA as a component of the humanitarian aid system and addresses how the systems perspective impacted the design and structure of this research.

3 RESEARCH METHODOLOGY

The phrase ‘nothing is as practical as a good theory’ is a twist of an older truth: Nothing improves theory more than its confrontation with practice. (Zetterberg, 1962, p. 189)

As the saying goes, “theory informs practice and practice informs theory” (Patton, 2014, p. 35). According to Eriksson & Engström (2021), before a researcher is able to make a claim about knowledge contribution to a field of practice, they must understand the ontological and epistemological underpinnings of the field to ensure their methodology is aligned with existing theory. In turn, well-executed research can refine theory, creating a reinforcing loop of knowledge building. Therefore, this section describes the research methodology used to conduct this research. It begins with the research approach and describes the paradigmatic foundations in the field of HSCM, how they have changed over time, and how they have influenced the framing of this research. The subsequent sub-sections then explore the research paradigm, design, and methods adopted for this thesis, as well as the associated ontological, epistemological, and methodological assumptions that guide the approach.

3.1 Research approach

According to Creswell (2014), a research approach consists of a plan detailing the choices and assumptions made at each step of the research process. The approach will inform the methodological choices and how data is collected, analysed, and interpreted. By specifying and explaining

the research approach and philosophical underpinnings, the research itself is more credible as it creates a narrative which the reader can follow (Crotty, 1998). Saunders et al. (2009, p. 128) described this process as the ‘research onion’ (Figure 4), which is comprised of different layers which are connected by a throughline from the researcher’s paradigm to their techniques for data collection and analysis.

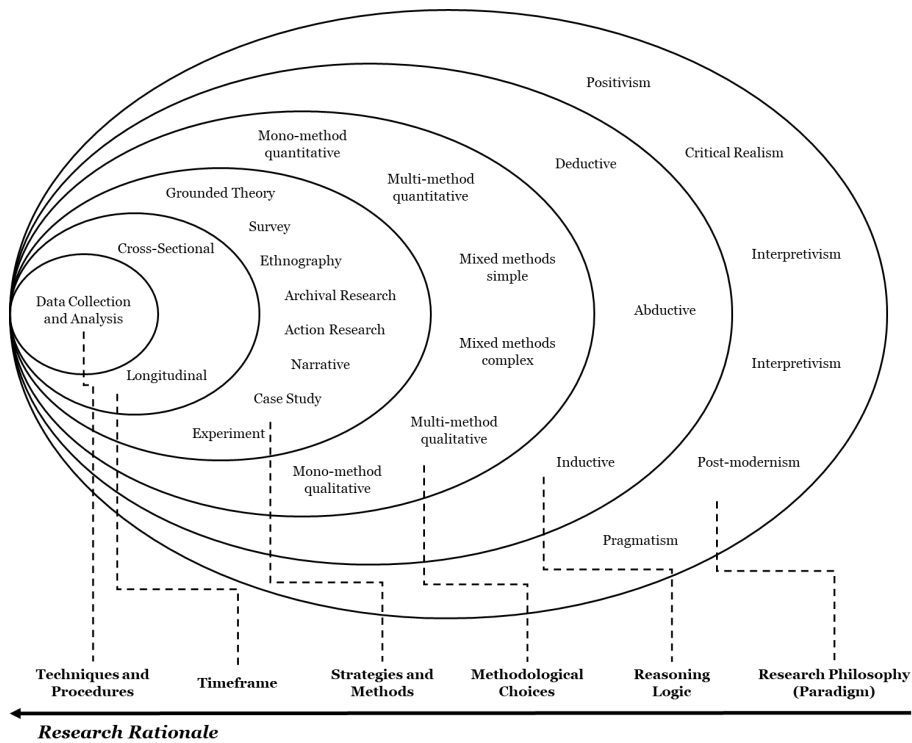


Figure 4: The ‘research onion’, adapted from Saunders et al. (2009).

Saunders et al. (2009) use the onion analogy as a visualization tool to represent the different layers which contribute to research methodology. Similarly, Creswell (2014) developed a framework in which three interconnected methodological components are both influenced by the adopted research approach, and also influence the possible courses of action the research will take. These are the research paradigm (i.e., philosophy), the research design, and the research methods. These elements both underpin and are underpinned by the mode of inquiry (e.g., qualitative, quantitative, or mixed methods) (Creswell, 2014). The application of these concepts is explained in the remainder of this section.

3.2 Research paradigm

A research paradigm is a philosophical worldview held by the researcher (Creswell, 2014), constituting a number of beliefs which guide the approach taken to the research (Guba, 1990; Guba & Lincoln, 1994; Kuhn, 1970). More detailed explanations of paradigmatic elements and characteristics vary throughout the literature of qualitative inquiries. For instance, Lincoln and Guba (1985) state that a paradigm has four components: ontology, epistemology, methodology, and axiology, whereas Crotty (1998) includes only ontology and epistemology. Regardless of the variations, the research paradigm both informs the design of the research and allows the research to be evaluated and understood by others who do not necessarily share the same worldview (Denzin & Lincoln, 2012).

Early supply chain management research was largely rooted in positivism (Mentzer & Kahn, 1995), under the notion that reality could be objectively explained through a structured research frame and empirical testing (Guba & Lincoln, 1989). However, scholars contested the notion of maintaining a positivistic-dominant view in SCM and suggested that the field must adopt additional perspectives to expand and grow (Arlbjørn & Halldórsson, 2002). Primarily, positivism's epistemology of objectivism limits the creation of knowledge in SCM through its quantitative and deterministic view of research (Aastrup & Halldórsson, 2008; Näslund, 2002).

Following this, several other paradigms and approaches were subsequently explored. Näslund (2002) argued for grounding logistics research in real-world problems, specifically through the inclusion of qualitative methods. Gammelgaard (2004) drew upon Arbnor and Bjerke's (1997) theory of methods framework and described three additional perspectives: the analytical, the systems, and the actors approach. Kovács & Spens (2007a) evaluated the paradigms of positivism, scientific realism, and interpretivism in logistics research and the contribution of each paradigm to theory building. As the field began to shift away from an objectivistic epistemology, Aastrup & Halldórsson (2008) called for a stronger emphasis on the localized research context and subjectivity of reality to express knowledge claims derived from case research. The authors suggested that critical realism is appropriate in that it can reveal the underlying causal mechanisms which govern and produce outcomes in supply chain and logistics systems.

Denzin & Lincoln (2012) describe critical realism's position as having a realist ontology and constructivist epistemology. In contrast with positivism, critical realism is non-reductionist and does not assume that a whole can be understood merely as a sum of its parts, but that the "parts and whole are both distinct from and internally related or essential to each other" (Bhaskar, 2008, p. xxi). Due to its non-reductionist and subjective epistemological stance, it may be more suitable for systems which have social elements, as the actors, as well as their interrelationships, influence the system's behaviour (Bhaskar, 1979; Danermark et al., 2005). As such, critical realism has been further explored in the field of SCM, expounding upon the multivariate nature of SCM research and how the interplay between actors in a system against their context generate causal mechanisms to be studied further, including power dynamics, network structures, and environmental effects (Adamides et al., 2012; Eriksson & Engström, 2021).

As a researcher with a background in engineering, much of my education was grounded in positivism. However, positivism's shortcomings stemming from its deterministic positioning were quickly recognized as they were unable to account for the complexities of humanitarian operations and investigation into the matter through qualitative means. As I wanted to emphasize the importance of contextual specificities in analyzing humanitarian responses (Sohn, 2018) a critical realist paradigm was adopted for this thesis to explore the CVA as a component of the humanitarian system and the underlying causal mechanisms within.

3.2.1 Ontology

Ontology is concerned with assumptions about the nature of reality *vis-à-vis* the researcher's paradigm (Guba & Lincoln, 1994). Critical realism differentiates between reality and observation, acknowledging the existence of a 'real domain' where mechanisms produce causal events in the 'actual domain', which can only be observed in the 'empirical domain' (Bhaskar, 1979; Danermark et al., 2005). There is no direct access to the 'real domain', only indirect access through conscious observation (Bhaskar, 1979). It is only through science and empirical research that we may begin to understand the underlying structures and mechanisms which produce events in the 'actual domain.' Thus, although a reality exists, it must be interpreted, directly and indirectly, and coded by the researcher (Danermark et al., 2005). CVA is a small component of HSCM, and operations are linked to context and time. What is observed through

this research is only a fraction of reality, but aligns with the aim of the research to understand causal mechanisms which enable CVA to be used more efficiently and effectively for relief operations.

3.2.2 *Epistemology*

In relation to the ontological stance, epistemology describes how knowledge is created and comes to be known by the researcher (Guba & Lincoln, 1994). In critical realism, interpreting observations made in the 'empirical domain' must be interpreted and relate to the practical relevance of the research itself (Danermark et al., 2005; Denzin & Lincoln, 2012). As noted by Sayer (1992), the usefulness of knowledge is dependent upon its practical relevance, which is predicated on how well the underlying causal mechanisms in the 'real domain' are captured (Danermark et al., 2005). This exemplifies the liminality, or 'in-between space' (Kovács & Spens, 2007a), of critical realism insofar as that ontologically it seeks to understand events and objects in the 'real domain' as they are, but all observations are influenced by the context, known causal mechanisms, and the researcher's relative epistemological stance (Sayer, 1992). Causation, therefore, is not absolute but must be understood through the processes and within the context in which the observation occurs (Pettigrew, 1992; Sayer, 1992). In this sense, critical realism can be fit for the purpose to investigate the utility of an object within its context (Patton, 2014). In this case, it is the practical use of CVA in humanitarian operations.

Unfortunately, data in humanitarian contexts is typically limited, fragmented, and difficult to access (Besiou et al., 2018; Yagci Sokat et al., 2018), meaning that what is observed is only a fraction of reality. The underlying social and economic structures which affect the magnitude of disasters (and, to an extent, responses) exist in the 'real domain' and are thus largely unobservable (Bhaskar, 1979). It is therefore equally important to consider and question what is unobserved and how it may impact what is being observed. Danermark et al. (2005) suggest structural analysis to conceptualize the abstract and concrete concepts of what is being studied, then use theory to help explain causal mechanisms. The following sub-section discusses the theoretical framework used for this thesis, how it is applied, and how it builds upon existing HSCM and CVA research.

3.3 Theoretical framework

Critical realism's epistemic emphasis on context relative to the object under study leads it to borrow theoretical elements from other traditions as needed to confront a research problem (Eriksson & Engström, 2021; Tashakkori & Teddlie, 1998). Similar to pragmatism, critical realism is not bound to one philosophical tradition or set of methodologies but adopts a mixed approach that unfolds along with the research (Creswell, 2014; Lincoln & Guba, 1985). The flexibility enables the researcher to triangulate findings by considering the object from multiple perspectives (Creswell, 2014), making it appropriate for applied interdisciplinary research (Danermark, 2019).

According to Craighead et al. (2007), HSCM is an interdisciplinary field by nature, addressing physical and social components of humanitarian systems concerning aid supply and distribution processes. The multiple actors represent different perspectives along the supply chain, each with its own role and purpose. Therefore, to address the supply chain system holistically, multiple perspectives should be considered to understand the phenomenon and to ensure internal and external validity (Singhal & Singhal, 2012).

3.3.1 *Theory building and borrowing in the HSCM research*

As a field of research, HSCM is relatively young (Altay & Green, 2006; Kovács & Spens, 2007b; Van Wassenhove, 2006) and has been critiqued for lacking a substantial theoretical base (Jahre et al., 2009), which lends itself to borrowing established theories from other disciplines (Tabaklar et al., 2015). This has resulted in a mixture of research methodologies being employed, depending on the problem under investigation (Kovács et al., 2018; Kunz & Reiner, 2012; Leiras et al., 2014). While the methodological traditions and theories applied are largely rooted in SCM and logistics disciplines (Tabaklar et al., 2015), they also span across other related disciplines, including operations research, disaster management, and development studies.

As a partial derivative of the SCM discipline, HSCM shares similar challenges in defining its identity and distinguishing between research streams. For instance, just as various interpretations of *supply chain management* exist (see Section 1.5.2), leading to numerous methodologies used within the discipline (Larson & Halldorsson, 2004; Seuring et al., 2005), HSCM shares aspects of its identity with *disaster*

management and *humanitarian operations management*, though each has developed into separate streams with different methodological approaches (Jahre et al., 2009; Oloruntoba et al., 2019; Tabaklar et al., 2015). As Aastrup and Halldórsson (2008) noted in the field of SCM, its multiple interpretations have created nonuniformity in its epistemological foundations. This also extends to HSCM in terms of the challenges it faces to define these distinctions, its link to practice, and its theoretical positioning (Jahre et al., 2009; Kovács & Spens, 2009).

Despite the challenges, theory borrowing should not necessarily be viewed as a negative aspect, as theories can be tailored to fit a research problem and also advance theory in the field in which it is being borrowed (Arlbjørn & Halldórsson, 2002). In this case, the larger SCM and logistics fields may benefit through the pushing of boundaries through related research in sub-disciplines (Halldórsson et al., 2015; Tabaklar et al., 2015). A broader range of established theories can then be applied to more diverse contexts (Kovács & Spens, 2007a). Oloruntoba et al. (2019) further posit that theory borrowing may be better suited than theory developing in HSCM due to the contingent and context-specific circumstances of humanitarian operations.

This aligns with the suggestion from Kunz et al. (2017), which states that knowing and understanding the context is one of the most important aspects of developing relevant research in the field of HSCM. Therefore, conducting research in HSCM lends itself to a pragmatic use of theory by letting the context and research problem guide the use of methods and theoretical approach (Kovács & Spens, 2011) in pursuit of practical findings. Dubois and Gadde (2002, p. 555) explain how ‘systematic combining’ can achieve this by matching existing theory to empirical work. Subsequent analysis and interpretation direct and redirect the researcher to new dimensions of the research problem. Thus, theory is built upon and refined to explain and explore empirical observations throughout the research. This thesis draws upon systems theory to address the dynamic interactions present in humanitarian supply networks and systems.

3.3.2 *Systems perspective as a theoretical frame*

Adopting a systems perspective is one way to understand the properties of a collection of objects connected together in their context (Checkland, 1981). Systems theory states that individual parts of the system cannot be fully understood outside of their context and in isolation, but only as a whole (Ashby, 1956; Bateson, 1979; Von Bertalanffy, 1950). A *system*

is a collection of entities, or subsets of entities, which interact and form relationships with one another (Arbnor & Bjerke, 2009). Systems can be either open or closed. In open systems, feedback is exchanged freely with the external environment; inputs from the external environment enter the theoretical boundary and interact with other entities inside the system, which create outputs that flow back into the external environment (Von Bertalanffy, 1950). Inputs flow into the system, are modified by the system components, and produce outputs. A representation of a system is shown below in Figure 5.

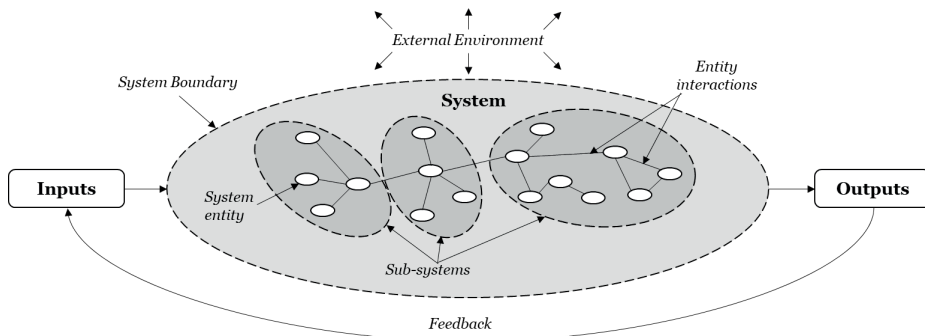


Figure 5: Example of a system and its components, adapted from Jackson (2007)

The systems perspective appeared in the mid-twentieth century, largely as an alternative to scientific reductionism (Jackson, 2007). Systems theorists argued that reductionism could not adequately explain complex and dynamic phenomena in certain fields of study, such as the social sciences (Ackoff & Gharajedaghi, 1996; Jackson, 1985). In essence, a system could not be understood by reducing it to the sum of its parts, but needed to be observed holistically, observing the interdependence of the parts in relation to one another and as a complex whole (Von Bertalanffy, 1950, 1972). The focus on holism and interconnections of system entities led the systems perspective to emerge as a transdisciplinary approach to complex problems, with systems theorists and researchers (i.e., *systems thinkers*) arguing that it is a way to understand an object through its parts, their interrelations, and relationship to the environment - all of which impact its behaviour, and purpose. (Arnold & Wade, 2015; Jackson, 2009a; Ramage & Shipp, 2009). The broad utility of the systems perspective as an inquiry framework has led to numerous forms of quantitative and qualitative applications, each with particular

implications for research methodology (Patton, 2014). In SCM and logistics research, the systems perspective has been used as an approach to address how components of a system (e.g., actors and stakeholders) interact and form sub-systems and, ultimately, a whole that is greater than the sum of the parts (e.g., the supply chain and embedded flows) (Moon & Kim, 2005; Solem, 2003; Stock & Lambert, 2001).

Gammelgaard (2004) further describes how the systems perspective in logistics differentiates itself from positivism, as the primary objective is not to uncover a universal truth but to develop a practical solution for the system under observation within the boundaries of the research object. Just as critical realism acknowledges the theoretical boundaries of the 'empirical domain' within the 'actual domain' and 'real domain', systems thinking demarcates boundaries around an observed system within a specified context with external forces acting upon it (Jackson, 2007; Von Bertalanffy, 1950). Therefore, observations which occur within the system are context dependent and cannot be reduced to a series of causal relationships (Jackson, 1985). In this manner, systems thinking shares similar ontological and epistemological underpinnings with critical realism (Eriksson & Engström, 2021; Johannessen, 2005) in that both are non-reductionist and posit that complex structures and systems cannot be merely understood by breaking them down into smaller parts to be studied, as the sum of the parts is greater than the whole due to the interrelationships of variables existing both inside and outside of the system, over time and space (Shaked & Schechter, 2017; Von Bertalanffy, 1972).

For this research, a systems perspective is taken as it aligns with critical realism under the premise that social systems cannot be analyzed properly with reductionist techniques as the most fitting explanations of the phenomena do not exist at the most basic level of observation (Given, 2008). To investigate the underlying causal mechanisms which affect outputs and outcomes, such as cost-effectiveness and efficiency, it is necessary to understand what resources flow into the system, which components constitute the humanitarian aid system itself, how the components interact, and how the context influences and bounds the system.

3.3.2.1 Humanitarian systems as complex social systems

Another important distinction to make regarding the framing of this thesis is that humanitarian systems are complex social systems comprised of individuals and organizations with differing goals,

attributes, and characteristics. Ackoff and Gharajedaghi (1996) posit that social systems are open systems which are complex in nature and differentiate themselves from deterministic systems in that both the parts and the whole are *purposeful*, meaning that systems can produce various outcomes in various environments through purpose-driven choices made by entities. These entities may represent stakeholders that have an interest in the problem or wish to produce a desired outcome, as well as other actors which play a role in generating specific outcomes (Checkland, 1981; Jackson, 2007). As shown in Figure 5, systems in this category may consist of hierarchies of nestled sub-systems, creating a complex web of interconnected entities representing social structures (Simon, 1996). For instance, if the *whole* system under analysis was a network of humanitarian actors, then each *individual* entity (e.g., an organization) would also be a system with its own set of *individual* entities (e.g., organizational departments), each with autonomy to make choices which affect the whole system, and whose choices are also affected by the system (Ackoff & Gharajedaghi, 1996). Giannakis & Croom (2004) further explored these different relationship levels within extant SCM research and provided a topology comparing which resources and assets are shared at the various levels in the chain or network. As the network expands, interdependencies between entities increases, which also increases the complexity of *purposeful* networks. As explained by Singhal & Singhal (2012), “the parameters (information and decision) of each unit in the network affect the parameters in other units, and within each unit, the parameters of each of its parts and functions affect the rest of its parts and functions” (p. 248). Therefore, a complex social system is one in which a large number of interdependent entities interact with one another and an external environment, creating emergent patterns of behaviour (Simon, 1996). This framing posits that, to better understand an entity’s degrees of freedom (in terms of future states), it is necessary to understand the decisions and actions made by other organizations in its network, as those decisions and actions influence the entity’s decisions and actions.

Nilsson and Gammelgaard (2012) argue that incorporating *complexity thinking* into the systems approach for SCM research can add an additional layer of depth needed to better understand emergent behaviour of entities in a system when no central rules govern the system. According to Yates (1978), for systems to be *complex*, they must display at least one of the following five features:

1. *a large number of components,*

2. *a large number of significant interactions between the components,*
3. *non-linearity,*
4. *asymmetry between components, and*
5. *nonholonomic constraints of the components.*

Complex systems which display self-organization of entities and emergent patterns over time are referred to as *complex adaptive systems* (Holland, 1996). In these adaptive systems, agents are both independent and continuously interact with one another, creating a dynamic state in which the system never reaches a state of equilibrium nor ever falls into a chaotic state (Stacey, 2007). A system's structure determines its behaviour (Sterman, 2000), with patterns emerging over time that describe the system's behaviour in archetypical ways (Choi et al., 2001). The structure is also affected by the system's interaction with the external environment, creating a compounding effect whereby the entities continuously adapt and re-organize as a consequence of the dynamic environment (Anderson, 1999). This dynamism and non-linearity between cause and effect make it difficult or sometimes impossible to predict future states since, according to Stacey (2007), causality in complex systems cannot simply be inferred from a static perspective, but must consider the dynamic underlying causal mechanisms, or rules, which govern the system. Yet, in complex non-linear systems, patterns of behaviour can still be observed, providing insight into the underlying structure of the system. Documenting these interactions and archetypical patterns over time (e.g., through system dynamics) can provide a holistic view of the system, including the feedback loops which provide the basis for behavioural assumptions (Nilsson & Gammelgaard, 2012).

Applying this concept to humanitarian systems, humanitarian supply networks fall into this category as their structure is comprised of numerous actors and stakeholders with dynamic interactions, leading to non-linear causal interrelations and self-organization (Choi et al., 2001; Day, 2014). Given that supply networks are sensitive to changes in their environment and can experience significant structural changes as a result (Choi et al., 2001), modelling the behaviour of humanitarian supply networks nestled in uncertain, complex, ambiguous, and rapidly changing environments can be extremely challenging. Actors enter and leave the system as the situation progresses over time, creating a dynamic and constantly evolving supply network structure, which complicates decision-making at the individual and collective level, leading to reactive,

rather than mitigative actions (Day, 2014; Hagelsteen & Becker, 2019). In humanitarian settings, the unpredictability of events and unknown causal factors limits response agility, further complicated by the need for coordination to execute efficient and effective responses. To counter this problem, Day (2014) argues for a supply network diverse in capabilities, with individual entities needing to be able to adapt their capacities according to the disaster context. Schiffing et al. (2020) further build upon this argument and posit that humanitarian agencies must not only react and adapt to the context but must actively create more favourable conditions in the operational environment that enable effective responses (e.g., through preparedness efforts). From a critical realist perspective, this infers further exploration of the ‘actual domain’ to reveal ‘unknown unknowns’ (e.g., underlying causal mechanisms which are not known but exist in the ‘real domain’) and better understand ‘known unknowns’ (e.g., uncertainties which have been identified in the ‘actual domain’ and need further analysis) (Ramasesh & Browning, 2014). In doing so, humanitarian organizations can better understand the variety of challenges they face and adapt their responses accordingly.

The concept of ‘variety’ in complex systems has its origins in cybernetics, referring to the potential number of states a system can have, which is dependent upon the number of components the system has, such as inputs, outputs, and controls (Ashby, 1956). The variety of the system and interconnectedness of the components allow a system to adapt and survive. In Ashby’s (1956) ‘law of requisite variety’, it is stated that a system can only survive if it is able to produce a greater variety of responses than the variety of disturbances it faces. Boisot and McKelvey (2011) further extend this law and posit that for a system to remain in balance and efficient at adapting to the environment, its internal complexity must be matched by the external complexity surrounding it. In relating this to the findings of Schiffing et al. (2020), it can be inferred that humanitarian organizations can be more efficient if external variety is reduced through better control over the operational environment, and internal variety is expanded through capacity-building efforts. As humanitarian organizations expand their capacities and develop their capabilities, they utilize resources more effectively (Vega & Sanchez, 2017), allowing for a greater degree of freedom in terms of the number of choices available to respond to complex situations.

The systems perspective and its associated branches of inquiry have been used in developing the theoretical positioning of the three articles. In Article#1, the relationship between the operational context, the actors

and their objectives (i.e., content), the cash delivery processes, and outcomes in humanitarian settings are analysed systematically. In Article #2, a complex emergency is analyzed using system dynamics to better understand how the relationship between humanitarian efforts and outcomes, such as disease prevalence. Finally, Article #3 addresses how a network of actors utilizes shared resources to meet broader network-wide objectives that go beyond the scope of any individual organization.

3.4 Research design

To conduct this thesis research in a structured and coherent manner, a plan was designed and followed throughout the different phases of the research. The design of this research follows three major steps used in systems analysis: problem formulation, analysis, and interpretation (Sage & Armstrong, 2010). Figure 6 shows the three key steps and the feedback loops that occur during the research process.

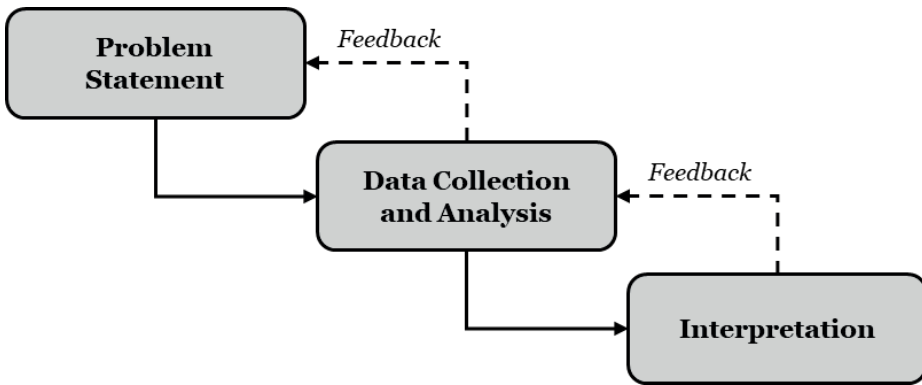


Figure 6: High-level iterative research process with feedback loops; adapted from Sage and Armstrong, 2010.

Both the thesis and the individual research papers followed the high-level process shown in the figure above for systemic consistency. The thesis research began with the formulation of the overarching problem statement, which was derived from a preliminary unstructured review of existing literature, as well as prior theoretical knowledge (Kovács & Spens, 2005; Patton, 2014). The initial review revealed the breadth and depth of available information related to CVA in humanitarian settings, both from academic and non-academic sources. Once the initial overarching research problem was conceptualized, smaller and more specific questions were formulated to guide the systematic literature review in a focused manner (Article #1). As demonstrated in Figure 7,

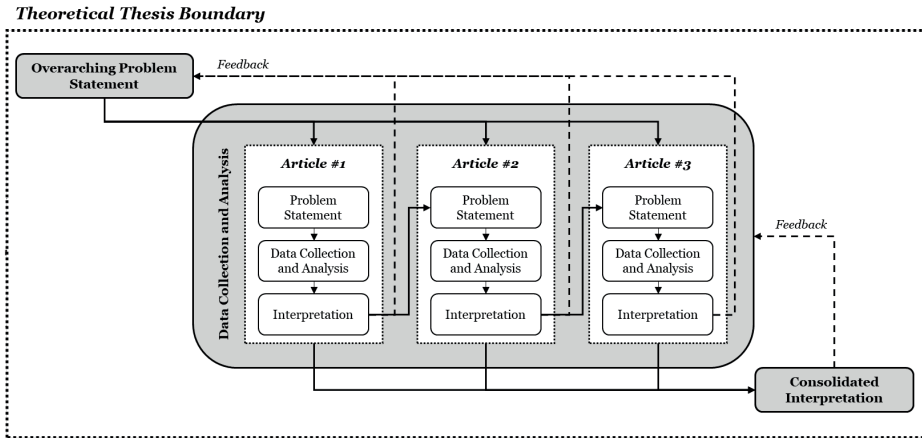


Figure 7: Research design for this thesis; adapted from Sage & Armstrong (2010).

According to Patton (2014), problem statements for qualitative inquiry should be iteratively refined as information about the phenomenon is revealed. Therefore, the feedback loops in the figure represent how the overarching research question was further sharpened after information was discovered from the individual research papers. This is similar to the 'critical realist spiral' conceptualized by (Pettigrew, 1992) as findings from the individual papers created links to the overarching research problem and helped design the research questions for subsequent papers. Additionally, this process helped to establish the boundaries of the research by closely examining the language used to define and describe the problem. According to Guba (1978), there is a tradeoff between research breadth and depth, which is partially determined by the open-endedness of the research question(s). Therefore, to keep the research objectives achievable in the budgeted timeframe for the thesis, theoretical boundaries (i.e., delimitations and methodological choices) were set to narrow the scope of the research (Patton, 2014).

Guba (1978) describes this process as moving between two phases, *discovery* and *verification*. A researcher observes (i.e., discovers) patterns that emerge in the object under observation, and then attempts to verify the emergent patterns through focused data collection and analysis, building upon existing theory. In line with the critical realist view, this iterative process seeks to best explain causal mechanisms which appear in the 'empirical domain' as they are in the 'real domain'. Figure 8 shows how this research used an iterative approach, moving between theory and empirical data as information was gathered, analyzed, and explained using existing theory, which simultaneously contributed to

theory building through interpretation of the findings (Dubois & Gadde, 2014; Kovács & Spens, 2005; Pettigrew, 1992). Through this heuristic process, the initial framework used to address the research problem underwent numerous modifications during the research process as empirical findings were revealed and interpreted.

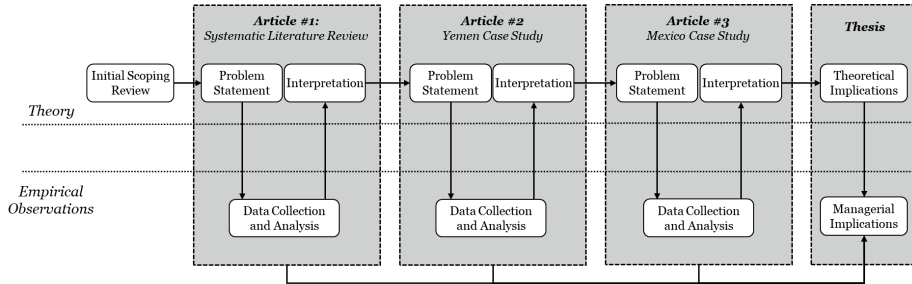


Figure 8: High-level iterative process for this research; adapted from Järvensivu and Törnroos (2010).

This research took a largely inductive approach, using an iterative process to build upon existing theory. Under the critical realist paradigm, the research process may begin with the researcher, who has pre-existing theoretical knowledge of the subject, empirically observing a deviation from accepted theory (Danermark et al., 2005). This may lead the researcher to borrow from additional existing theories (i.e., ‘systematic combining’) to refine the theoretical framework through additional observations to explain the deviation (Dubois & Gadde, 2002). In this case, prior to initiating this research, I noticed that CVA followed the same design and implementation process as in-kind assistance. Yet, its success was not dependent upon the same factors as in-kind, which meant that its success was not able to be determined using the same processes as in-kind. Extant literature was consulted to help understand the interplay between CVA and supply chains, which helped formulate a starting research question. Yet, it was not evident that the current state of literature was sufficient to explain this in detail, so an SLR was conducted to piece together additional information, which led to a refined research problem statement. The theoretical findings from Article #1 were used as a starting point to initiate Article #2, impacting the methods and assumptions of the study. The data collection and context also refined the overall research problem, while also highlighting the need for a better understanding of antecedents to the use of CVA in disasters. Therefore, Article #3 drew upon both prior studies as a base to further explore causal mechanisms through a case study. Finally, this iterative process

resulted in the formulation of theoretical and managerial implications within each study as well as across each study.

The final stage (referring back to Figure 7) is the interpretation of the results and findings, which is necessary if the data is to be made sense of and applied (Sage & Armstrong, 2010). In qualitative research, the meaning extracted from the data is subject to the goals and objectives of the researcher (Creswell, 2014; Lincoln & Guba, 1985). Interpretation should be checked for validity and reliability, which can be conducted in several ways, such as data triangulation, reflection and bias acknowledgement, and external auditing. Each individual study went through its own stages of reliability and validity checks in the authoring and peer review phases. In addition to this, a reflexive statement is provided in Section 3.6 which explains the personal basis for the researcher's interpretation of the findings.

3.5 Research methods

The tools and techniques used to investigate the research problem influence how data is collected, analyzed, and interpreted in relation to the research paradigm and following the research design (Creswell, 2014). In this research, three studies explored the utility of CVA within the context of humanitarian networks (e.g., the system). The methods used to carry out the research are predominately qualitative to derive meaning from themes, ideas, concepts, and patterns of a system (Patton, 2014).

Although systems theory is often associated with quantitative research, a growing field of literature has demonstrated how it can be applied qualitatively (Ackoff & Gharajedaghi, 1996; Azumi, K., & Hage, 1972; Checkland, 1989; Denzin & Lincoln, 2012; Patton, 2014). The systems thinking perspective is complementary to qualitative research in that it contributes to sense-making and understanding of the relationships that exist between variables in their context by adopting a holistic perspective (Denzin & Lincoln, 2012; Patton, 2014). Applied to social structures, a systems perspective seeks to understand the underlying purpose for which a system operates in the manner that it does (Ackoff & Gharajedaghi, 1996). Similarly, the system must be studied within its context which provides a base for interpretation and sense-making of observations (Denzin & Lincoln, 2012). Thus, this form of qualitative systems thinking is more than just the sum of the individual parts but can be used to explore complex structures which are not reducible to basic components.

The methods employed in the three research papers are largely explained within each respective essay. However, the remainder of this sub-section provides additional details connecting each method to the research approach.

3.5.1 Article #1 Methods: Systematic Literature Review

In order to contribute to the body of knowledge on CVA in humanitarian settings, an extensive literature review was necessary to understand the current state of literature related to the topic as well as gaps in knowledge. This allows additional studies to fit into the larger body of knowledge and build upon existing theories (Creswell, 2014). Furthermore, it informs the researcher of traditional and contemporary research methods used to carry out investigations within the field.

A systematic literature review (SLR) was used to conduct this initial investigation. An SLR is a structured research process to collect, analyze, and synthesize studies related to a specific research question (Tranfield et al., 2003). This differs from a traditional literature review insofar as the rigour and robustness required to conduct the review (Rousseau et al., 2008), beginning with defined research questions and concluding with a synthesis of findings. This method has been recommended for SCM literature, as much of the existing literature in the field is not ontologically and epistemologically uniform (Durach et al., 2017) therefore needing more coherence. One of the key characteristics of SLRs in the SCM discipline is that studies should be able to describe the theoretical boundaries of the system in which the phenomenon occurs and the relationships between the concepts involved in the study (Durach et al., 2017). This step is largely dependent upon the researcher's scope for the study (Hall & Fagen, 1968), but may change expand or contract throughout the investigation. The review was bound by the keywords used in the search, targeting humanitarian supply chains and the application of CVA, which is further described in Article #1, Section 2.1

For the analysis, Pettigrew and Whipp's (1993) content-context-process framework provided structure in line with the systems perspective. According to the authors, outcomes are determined by the actors and entities carrying out an action (content), the context in which the action occurs, and the processes that carry out the action. These variables provided information as to when CVA is utilized, how it is utilized, and by whom it is utilized. The context consists of both internal and external factors which frame the aspects of the content and process components (Pettigrew, 1992). In humanitarian settings, context

dictates how organizations respond to situations (Gustavsson, 2003; Pedraza-Martinez & Van Wassenhove, 2016), including response phases, stakeholders, and geographical considerations (Kovács & Spens, 2007b). Furthermore, external and environmental factors, along with the previously mentioned market factors, determine whether CBIs, in-kind aid, or local procurement of goods should be used to meet the beneficiaries' needs (Harvey & Bailey, 2011; Piotrowicz, 2018). In this study, the literature was categorized based on these contextual factors to determine which modes of response were used in various contexts and how they impacted the supply chain with respect to material, financial, and information flows.

The coding scheme aided in the analysis and interpretation of results, providing structure to the information extracted from the literature. The findings contributed to the structure of this thesis in three primary ways. It helped to refine the original research problem (see Figure 2), provided direction for Article #2 and Article #3 (Article #1, Section 4), and further defined the boundaries of the 'system' under study.

3.5.2 Article #2 Methods: System Dynamics

The second paper builds upon the findings of the SLR through a case study investigating how CVA delivery processes are impacted by environmental factors and contextual uncertainties using system dynamics. Case studies are suitable, as they are bound by the period of observation and activity under observation (Aastrup & Halldórsson, 2008; Gammelgaard, 2004; Yin, 2012). Yemen was the chosen context of the case study, as it represented one of the most complex humanitarian situations at the time with the ongoing conflict, food insecurity, and cholera outbreak (UNOCHA, 2019). The number of dynamic system factors and their nonlinearity creates a situation of uncertainty for humanitarian organizations, which have to adapt to the context in order to remain competitive. To make sense of the complex situation, system dynamics methods were employed.

System dynamics was originally developed by Jay Forrester to understand the dynamic behaviour which governs social and economic systems (Forrester, 1961), which are more complex than industrial and mechanical systems. Entities in the system form networks and their relationships and interactions form balancing and reinforcing feedback loops, which influence outputs from the model (Schwaninger, 2016). Thus, complex problems with multiple components could be analyzed and reliably understood, which appealed to organization and

management sciences (Jackson, 2009b). The works of Senge (1990) and Sterman (2000) further popularized system dynamics and expanded its application towards 'soft OR', which created divergent views of what system dynamics is and how it should be applied (Forrester, 1994; Jackson, 2009b). One proponent of soft system methodologies, Peter Checkland, argued for a more interpretive approach to systems thinking by blending it with qualitative modes of inquiry from social sciences (Checkland, 1981, 1989; Jackson, 2009b).

Aligned with the research approach of the thesis, the decision was made to create a qualitative model, which eliminated simulation-related capabilities, meaning that system behaviour could only be inferred rather than deduced (Lane, 2008). This decision was made for several practical reasons as well, including concerns about data availability, access, and privacy. The objective of the study was to understand how CVA and in-kind aid contributed to cholera control efforts in Yemen. However, these interventions were only part of the effort to combat cholera in Yemen, which has been an ongoing effort since 2007 by numerous organizations. Not all of these efforts were adequately documented, and the ongoing conflict and protracted crisis in Yemen which has displaced millions only allowed for limited data collection. Even if such data existed, access may not be possible due to the protection and privacy of vulnerable populations. Furthermore, decoupling CVA with other forms of aid, such as vaccine information campaigns, could prove to be too reductionist and undermine the systems perspective adopted for the study. Therefore, for the sake of feasibility within the study, a qualitative causal loop diagram was developed to form a narrative and extract information relevant to this research.

Creating the model was an iterative process which began with a desk review of relevant information related to the research questions. External sources were also consulted for additional information and reports, including a senior member of the Global Logistics Cluster and a data analyst from ACAPS for the Yemen crisis. After the data collection, an initial diagram was made based on causal relationships extracted from literature and fit to existing and system dynamics archetypes. These were cross-referenced with other documents for verification. Then, a series of interviews with a field expert added another step of verification. The model was not finalized until agreed upon by the field expert and the team. This is explained in greater detail in Section 4.2 of Article #2.

In conjunction with the findings from Article #1, the findings from Article #2 contributed to the overarching research problem and the research direction for the third study.

3.5.3 Article #3 Methods: Field Research and Qualitative Analysis

The third study also took a case study approach, but the data collection was conducted through field research. One of the limitations of Article #2 was the researcher's lack of proximity to the system under observation, which created a reliance on second-hand accounts. To overcome this limitation and confirm the findings from the second study, I immersed myself in the operational context of the third study, Mexico, for a period of three months. The opportunity to conduct field research allowed for a 'close observation' of the object of the study, grounding the study empirically with contextually rich information (Sohn, 2018). Additionally, applying case study methodology provided a customizable approach to address context-specific practices and components within a system (Seuring, 2008) such as capabilities and capacities needed for CVA. The following subsection describes the context in which the field research took place.

3.5.3.1 Mexico Context

Mexico has a long history of using cash assistance as a mechanism for poverty reduction (Masino & Niño-Zarazúa, 2020). Once called a "model for the world" (World Bank Group, 2014), the social assistance framework was one of the earliest models to provide evidence of the effectiveness of cash for poverty reduction and was replicated throughout the world (Harvey & Bailey, 2011). Although social inequalities remain high, the early adoption of CVA by the government, combined with the developing market economy and banking infrastructure, provided an opportunity for humanitarian organizations to support refugees with cash (OECD, 2018).

Yet, despite Mexico's relatively advanced national social protection framework and use of cash transfers for development, there was little integration with humanitarian relief programmes (Chapman et al., 2022). For several decades, Mexico has been a transit country and destination for refugees and other persons seeking asylum from conflict and social injustices in Latin America and the Caribbean. These populations are often excluded from social protection programmes until they can become naturalized in Mexico or gain refugee status. Thus, despite Mexico's history of using cash transfers for poverty reduction, humanitarian organizations still needed to build CVA programmes from the ground up, though design mechanisms could be borrowed from the social protection programme (Chapman et al., 2022).

The situation became dire during the COVID-19 pandemic, which had severe social and economic effects on Mexico. In 2020, the government of Mexico reported over 1.4 million cases of COVID-19, with an estimated 123,000 deaths (WHO, 2020) and the third-highest case mortality rate for that period. Many countries in Latin America closed their border or restricted movement in-country. Despite the risks presented by COVID-19 and the restrictions on migration, asylum seekers escaping from violence and political turmoil in Central and South America continued to arrive at the Mexican border, deepening the humanitarian crisis in Mexico. Detention centres which held migrants in Mexico were overcrowded as authorities assessed how to verify asylum claims and ensure the virus was not entering the country (MSF, 2020). This led to a problematic situation: on one hand, the Government of Mexico needed to provide refuge for asylum seekers, and on the other, it also needed to protect the public health of its citizens and reduce the risk of COVID-19 spreading further.

Furthermore, refugees and migrants already residing in Mexico were impacted by the reduction of informal labour and increased financial exclusion as a result of the restrictions and social distancing measures (OECD, 2022). In a time when it was questioned whether physical goods could safely be distributed to beneficiaries in need, humanitarian organizations in Mexico began scaling up their CVA programmes or began delivering CVA for the first time in Mexico to alleviate the pressure from the government restrictions. As the cash working (CWG) group formed just before the onset of the pandemic, insights could be drawn as to how organizations collaborated to overcome dynamic challenges.

3.5.3.2 Data collection and analysis

As the study analyzed different levels of the CVA supply chain (network, organizational, and team level), a ‘flexible focus’ approach was used (Stuart et al., 2002) by relying on multiple primary and secondary sources and using various qualitative methods to gather information. Primary data was collected through (1) semi-structured interviews with members of the CWG in Mexico, as shown in Table 4 of Article #3, (2) observing the drafting and launching of the joint tender, (3) attending meetings between the CWG and nationwide financial service providers, and (4) reviewing meeting minutes and records of the CWG. Secondary data, such as external reports, studies, and publications, were used for contextualization and triangulation of information (Seuring, 2008). The use of direct, indirect, and interviewing data collection techniques

contributed to the validity of the research (Ellram, 1996; Yin, 2012). In collecting and storing the data, a strict protocol was followed to ensure the privacy and integrity of the organizations and participants involved.

To ensure rigour, a five-stage process for case research proposed by Stuart et al. (2002) was followed. In the first phase, the research questions were formulated from information gathered in Article #1 and Article #2 and aligned with the overall research problem of the thesis. Specifically, this was reflected in the lack of studies about CVA preparedness (Article #1) as well as the need to better understand how multiple actors form collaborative networks in a singular context (Article #2). Second, the research context was specified and described, along with protocols to guide the collection, analysis, and storage of data in the third phase. In the fourth phase, analysis was performed to draw observations from the data. Finally, in the fifth phase, the findings of the research were constructed in a way to satisfy the research questions and demonstrate the validity and reliability of the findings through a framework for research quality (Halldórsson & Aastrup, 2003).

One of the difficulties experienced when gathering data from a network of organizations was the lack of agreement about data collection and usage. Although access was granted to view and read reports, documents, and other secondary sources from the CWG, there was still a necessary review process for the data that was to be used or published for this thesis. That meant that each member should individually review the information that pertained to their respective organization *before* it could be published. This began to involve different units at different levels within each organization, some of whom simply did not respond. To circumvent this problem, the names of the organizations involved were anonymized, with identifiers removed to protect the individual respondents and organizations. This move was agreed upon unanimously by the CWG under the condition that the lead organization remain responsible for conducting the review, thus permission was granted to use the information obtained during the field research visit.

The data gathered from the interviews were recorded and transcribed by the researcher. The coding procedure for the data followed Corbin and Strauss's (1990) method starting with open coding to break down the data into smaller parts, followed by axial coding to group the data, and finally, selective coding to draw connections to the central theme of preparedness. During the analysis, trends emerged in two ways: within each organization and between organizations, allowing for convergent

and divergent trends to be captured (Guba, 1978). Each organization's capacities and capabilities were then assessed independently, as well as collaboratively at the network level. The aim was to achieve a holistic view of the CWG while understanding how the individual components contributed to the functioning of the whole.

To maintain quality in the research process, a protocol originally developed for case studies in logistics research was followed (Halldórsson & Aastrup, 2003). The protocol draws upon existing frameworks of evaluation criteria for quality research (e.g., Ellram, 1996; Erlandson et al., 1993), and extends the criteria beyond validity and reliability toward 'trustworthiness', which is critical to quality logistics case research (Halldórsson & Aastrup, 2003). *Trustworthiness* demonstrates rigour and is evaluated through four key criteria: credibility, transferability, dependability and confirmability (Guba & Lincoln, 1989). Table 4 specifies how each of these criteria was implemented in this study.

Table 4: Quality criteria to establish trustworthiness in relation to Article #3; adapted from (Halldórsson & Aastrup, 2003).

Quality Criteria	Actions Taken
<i>Credibility</i>	Use of multiple primary sources to build evidence base (data triangulation + group interviews), documentation of the chain of events throughout the field research period, and reviewing the findings with key informants.
<i>Transferability</i>	Sought generalizability by comparing observed processes to extant CVA preparedness procedures and SOPs for triangulation and external validity.
<i>Dependability</i>	Established data collection protocol for repeatability and compiled evidence in a case study database.
<i>Confirmability</i>	To pursue objectivity in the creation of information, interviewees had the option of reviewing notes taken by the interviewer and the findings before the study was finalized.

3.5.3.3 Data Management

Given the sensitive nature of the data collected from humanitarian organizations, all data followed both the Data Management Standards at the Hanken School of Economics and the standards of each individual humanitarian organization for storage, usage, and disposal. The data was encrypted and stored in a Hanken-provided network. The data has not been published in open sources and remains compliant with the Finnish Act on the Openness of Government Activities, the Finnish Personal Data Act, the Finnish Copyright Act or the EU's General Data Protection Regulation.

3.6 Reflection on case selection and data collection

Although critical realism affords the researcher flexibility to align theories and methods to each study, this flexibility needs to be matched with mechanisms to address fallacies and potential biases presented by the researcher (Cunliffe, 2003). *Reflexivity* is self-awareness of how one's beliefs, values, and perspectives affect social interactions and experiences in the world (Rennie, 2004). In qualitative methods, it refers to how the background and position of the researcher influence what is investigated, why it is being investigated, how the investigation is carried out, and how the results are interpreted (Alvesson & Sköldbberg, 2017). Acknowledging, questioning, and even deconstructing one's own ontological and epistemological assumptions can strengthen a researcher's argument and lead to a richer understanding of complex and context-specific social exchanges (Cunliffe, 2003). Rather than trying to manipulate the investigative process, reflexivity allows for the recognition of how information is understood and how knowledge is created. Thus, this final subsection reflects on how the researcher influenced, and was influenced by, the empirical elements of the research process.

Regarding Article #2, the researcher was never been physically present in Yemen, but had worked on procurement cases for Yemeni field operations in a previous position. The fact that Yemen has been facing a brutal and complex humanitarian crisis, yet largely forgotten, was a motivator to use this context for the first case study. In contrast with the conflict in Syria, media attention, funding, and information related to the conflict in Yemen were sparse. Thus, the researcher chose Yemen as the context of the first case study not only because of its fit to the research problem but also because of its potential contribution to a lesser-known cause in the humanitarian sector. Additionally, the country had recently witnessed one of the worst outbreaks of cholera in modern history, which is a largely preventable disease. For this reason, the scope of the case study was further narrowed to see how CVA impacted cholera control mechanisms in the country. Finally, due to the lack of access to the context under study, the researcher could not verify the reports used in the case study first-hand and instead relied on the triangulation of secondary reports and expert witnesses for verification.

The research visit to Mexico for Article #3 presented a different set of circumstances. First, the researcher has previously worked with members of the lead organization, which allowed for the opportunity to collect data. Moreover, at the time of data collection, Mexico was hit particularly hard

by the pandemic, creating large social and economic impacts. CVA was used by humanitarian organizations and by the government to help offset some of the negative economic effects, therefore the project was very timely, but added an extra layer of difficulty as the situation was changing daily. All meetings were conducted remotely due to social distancing measures in place at the time. Furthermore, the unfolding nature of the pandemic meant that organizations were inherently more interested in continually adapting their responses to the changing situation than this research. Thus, to the extent possible, the working environment and priorities of each humanitarian organization were respected during the data collection phase.

For a period of three months, data collection took place while embedded in the local context, which included participation in meetings and procurement activities described in the case study. Through immersion, data collection was both implicit and explicit through observation and experience in the local context (Patton, 2014). By learning through observation, richer information could be extracted from the context (Lincoln & Guba, 1985). In this case, the semi-structured interviews were conducted in the final month of the research visit, so rapport and some degree of trust had been built between the researcher and the interviewees before the interviews were conducted. From the researcher's perspective, this contributed to the quality of the interviews as less time was needed for introductions and describing the project. Each interview was recorded so that information could be reviewed while creating and cleansing the transcriptions. Copies were provided to each interviewee after the interview phase. At all times, the researcher encouraged contributors to ask questions and provide feedback, which aided the reflexive element of the research.

Although Articles #2 and #3 represent different contexts, the purpose was not to compare and contrast the two settings, but to represent how CVA functions across contexts. Article #1 provides general findings from a larger set of studies, but by no means covers every unique situation in which CVA is used. Rather, it paints a picture of the operational range that CVA has. The purpose of using case research for Articles #2 and #3 was to ground the research in real-world settings. Article #2 represents a complex situation with numerous obstacles, but one in which CVA can still be operationalized, while Article #3 provides a unique set of circumstances in which a country which has demonstrated success using CVA for government-led developmental programmes, but has faced challenges when providing assistance to refugees and migrants

for humanitarian purposes from non-government organizations. Thus, while the two articles represent different contexts, they are both a part of the larger humanitarian system and contribute to the broader research questions under investigation.

4 OVERVIEW OF ARTICLES AND FINDINGS

The supply segment [of CVA] is just part of the process. It's a lot more complex; a lot of elements are included so that it's never just one angle, it's never just the supply angle. It always supply chain with finance, protection, and registration. If any of the pieces are missing from this puzzle, it's not going to work. These are all key elements in terms of the whole flow from targeting to delivery, and monitoring of that delivery, and planning for the next cycle. (Interview #2, Article #3)

As stated in the previous section, this thesis was designed around the findings of three research papers. Each paper has undergone a peer-review process and offers contributions as a singular study. Simultaneously, all three papers build upon one another and offer implications for the overarching research question in this thesis. The following subsections provide a summary of each of the research papers, their contributions, and how they relate to the overall theme of this thesis. Table 5 below provides a summary of the three articles, including thematic data related to the theme and findings of each study, as well as descriptive data for the publication and bibliographic information.

Table 5: Summary of articles .

	Article #1	Article #2	Article #3
Title	Cash and Voucher Assistance along Humanitarian Supply Chains: A Literature Review and Directions for Future Research	An analysis of compounding factors of epidemics in complex emergencies: a system dynamics approach	Preparing for Cash and Voucher Assistance: Developing Capabilities and Building Capacities
Aim of Research	Investigate extant literature linking SCM and CVA; explore relationships between the two topics, conduct contextual analysis, note gaps, and suggest future research opportunities.	Address complexities and dynamic nature of decision-making in humanitarian settings; explore the interactive effects of internal/ external factors and their impact on the system.	Explore how organizations prepare for CVA; determine capabilities and capacities necessary for CVA operations.
Research Methods	Systematic Literature Review	System Dynamics	Qualitative Analysis
Thematic Data	<p>The findings reveal that the outcomes of CVA programmes are dependent upon critical context-specific factors which influence feasibility and operability. Humanitarian actors must consider factors that are external to the supply chain (i.e., the nature of disaster, politics, economy, and infrastructure) as well as internal to the supply network (i.e., local market availability and accessibility, supplier/donor interest, supplier/vendor selection and contracting, and beneficiary preference). The delivery process is influenced by these factors, which has an impact on programme responsiveness and cost-efficiency.</p> <p>The results provide insights for humanitarian practitioners to reconsider their supply chain strategies when deciding on the selection and implementation of CVA programmes. Potential gaps in the literature are identified, and recommendations for further research are listed.</p>	<p>Compounding factors that influenced the cholera outbreak in Yemen are visualized in a causal loop diagram, which can improve the understanding of relationships where numerous uncertainties exist. A strong link exists between humanitarian response and the level of infrastructure development in a country. Supply chains are affected by constraints deriving from the Yemeni conflict, further inhibiting the use of infrastructure, which limits access to basic goods and services. Aligning long-term development objectives with short-term humanitarian response efforts can create more flexible modes of assistance to prevent and control future outbreaks.</p> <p>This study presents a systematic view of dynamic factors existing in complex emergencies that have cause-and-effect relationships which affect decision-making. This model incorporates those factors from a logistics perspective, addressing how in-kind goods and CVA can be used simultaneously to achieve a goal (i.e., cholera reduction and control).</p>	<p>The growth of cash and voucher assistance in humanitarian settings has led to a recognition of the importance of developing preparedness measures to ensure programmes are designed and implemented effectively. An organization's ability to deliver CVA is dependent upon available capacities and acquired capabilities, emphasizing the importance of information-sharing networks continual development of skills and knowledge.</p> <p>This chapter addresses how humanitarian organizations can improve their level of disaster preparedness through a resource-based view of capacities and capabilities. A practical case example is presented and analysed, emphasizing the role of networks and resource-sharing in CVA preparedness and efficiency.</p>
Authors	Amin Maghsoudi, Russell Harpring, Wojciech Piotrowicz, and Graham Heaslip	Russell Harpring, Amin Maghsoudi, Christian Fikar, Wojciech Piotrowicz, and Graham Heaslip	Russell Harpring
Status	Published	Published	Published
Journal/Book	Disasters	Journal of Humanitarian Logistics and Supply Chain Management	Humanitarian Logistics, 4th Ed.
Descriptive Data			

4.1 Article #1

The purpose of the first study was to explore and synthesize extant literature related to the logistics considerations and supply chain factors for CVA programming. The SLR provided a better understanding of the intersection between HSCM and CVA as well as a theoretical base established to position the empirical work. The contributions of this study stemmed from two separate analyses conducted, descriptive and thematic. This was to provide both qualitative and quantitative elements to the study by seeking to identify statistical trends in the data available and thematic idiosyncrasies within the texts (Durach et al., 2017). The thematic analysis was structured using Pettigrew and Whipp's (1993) content-context-process framework. This approach is meant to highlight the importance of context in humanitarian situations, and analyze which modes of delivery work best in which situations. These analyses were not done separately, but rather in tandem to holistically approach the research questions.

The first and most general contribution of Article #1 was the consolidation and organization of relevant literature related to CVA and HSCM. Logistics and SCM are crucial elements of delivering effective and efficient humanitarian responses. Delivering cash and vouchers in humanitarian contexts alters the supply network and often brings new actors into the supply chain, which has been discussed piecemeal by practitioners and in academic literature. Unifying this literature on the academic side then provides a synthesis of what is currently known about the relationship between CVA and HSCM, as well as what has not yet been studied.

Second, the descriptive analysis provided insights into the progression and direction of research in this field. Nearly one-third of all selected papers were from journals outside of the SCM and humanitarian studies disciplines, which underscores two ideas pertinent in the literature: 1) CVA by its nature involves multiple actors across different sectors to conduct its programmes and operations (Heaslip et al., 2018a) and 2) researchers from other disciplines are discussing supply chain-related information to deal with complexity and uncertainty in operations (Lewin et al., 2018). It is stated that both HSCM and CVA are interdisciplinary fields (e.g., Bastagli et al., 2016; Overstreet et al., 2011), but this finding infers that the field of research is moving towards transdisciplinarity in its approach to complex problems. Transdisciplinary approaches span between and across different disciplines and go beyond each individual

discipline to converge on a topic holistically (Hofkirchner & Schafranek, 2011). This concept echoes the call from practitioners and academics to adopt a more holistic approach to managing complex humanitarian emergencies (Rozakis, 2007; Tatham & Houghton, 2011), but further suggests that complex humanitarian problems require an equally complex variety of solutions (Boisot & McKelvey, 2011) delivered in a unified manner by the network of actors.

The need for holistic approaches also refers to the dimensions of time and space, which are not equally represented throughout the literature. Disasters are cyclical, thus inputs at one phase have causal effects in subsequent phases (Kovács & Spens, 2007b; Rozakis, 2007). The descriptive analysis revealed a lack of studies which discuss CVA in the preparedness phase (see Figure 3 of Article #1). This finding was contradictory to the rhetoric of practitioners who were advocating for better CVA preparedness measures to be developed and implemented across the sector (Spencer et al., 2016). The identification of this knowledge gap influenced the direction of Article #3 to explore the concept of CVA preparedness as part of the disaster management cycle.

Third, the thematic analysis investigated how the CVA process was influenced by the context and actors and resources available, which ultimately influenced outcomes (Pettigrew, 1992). A systems perspective allowed for multiple points of view to be compared against one another in the analysis (Ackoff & Gharajedaghi, 1996; Checkland, 1989), addressing how the composition of the supply network of actors influences the way CVA is delivered to beneficiaries. As donors are the ultimate suppliers in the CVA supply chain, they heavily influence the decision-making process carried out by humanitarian organizations, which impacts the programmes used by the beneficiaries. Similarly, the selection of delivery mechanism is also dependent upon the availability of services and the capacity of the financial service provider. Although the literature emphasizes the importance of beneficiary preference in programme design, it still must fit into the boundaries established by the donors and financial service providers (p. 9 of Article #1). Humanitarian organizations are ultimately tasked with the design, implementation, and monitoring of programmes, therefore the selection of delivery mechanisms is influenced by donor preference against beneficiary preference and constrained by internal capacities within the organization and external capacities, such as the FSP network. All these factors influence programme outcomes.

Outcomes were measured by cost-efficiency and responsiveness, which are frequently used indicators for HSCM and CVA (see Section 3.2.4 of Article #1). The content-context-process framework allowed specific findings to be linked to contextual variables and supply chain factors. For instance, the context-specific factors which underpinned CVA feasibility (Table 3 of Article #1) were linked with capabilities necessary for CVA programming (Table 4 of Article #1) to frame the outcomes (Table 5 of Article #1) of each delivery mechanism. This systematic approach grounded each of the findings in their context, but also converged them with information revealed across studies.

Finally, as demonstrated in Figure 6 of Article #1, knowledge gaps were identified which led to suggestions for future research. Of the six core gaps identified (see Section 3.3 of Article #1), three were taken forward and addressed in Articles #2 and #3. These three gaps are: 1) the lack of clarity related to modality and delivery mechanism selection, especially in conflict zones, 2) the lack of information related to CVA preparedness, including how the network of actors impacts preparatory activities and initiatives, and 3) the lack of evidence around the coordination of actors, especially how networks form and share information. The first gap is addressed in Article #2, and the second and third gaps helped position Article #3.

4.2 Article #2

The purpose of the second paper is to address the uncertainties and dynamism of decision-making in complex humanitarian settings by studying how internal and external factors interact and affect process outcomes. As emphasized in Article #1, CVA is essentially a tool used by humanitarian organizations to achieve an objective. The usage and functionality of CVA are dependent upon the context of implementation. Humanitarian contexts are often volatile, uncertain, complex, and ambiguous which impacts responsiveness through feasibility and operability constraints (Besiou et al., 2018; Narayanan & Altay, 2021). This creates an immense challenge for humanitarian organizations to make sense of the environment they are operating within, including the number of compounding factors which affect the delivery of aid. Article #2 explores these dynamic factors through three interconnected causal loop diagrams, creating a high-level model of the system.

Therefore, one of the principal outputs of this research is the causal loop diagram itself, which provides a visual tool for the sense-making of compounding factors in complex emergencies. Although the model

is qualitative, it provides value by depicting the behaviour of a complex system based on deductive assumptions interpreted by the researcher (Checkland, 1981; Sage & Armstrong, 2010). The model in this study is comprised of three parts:

1. *the operational context in Yemen and the causal relationships present between internal and external variables (Figure 1 of Article #2),*
2. *a model representing humanitarian efforts to provide aid (Figure 2 of Article #2), and*
3. *a susceptible-infected-recovered CLD to depict how cholera affects a population (Figure 3 of Article #3).*

Figures 2 and 3 are derived from already existing and verified models (Gonçalves, 2011; Anderson & May, 1991, respectively) and were extended in this study by linking them to Figure 1. The purpose of connecting these three models was to demonstrate how contextual factors influenced the delivery of humanitarian aid, which impacted the cholera prevalence rate in Yemen. By investigating the cholera outbreak in Yemen, the model was given real-world parameters and boundaries, which contributed to its practical value. The model included both CVA and in-kind modalities since they were both used for the response in Yemen. Each modality created unique causal effects that contributed to the response efforts, thus while the reports suggested that CVA might be more cost-efficient in Yemen, both modalities used in tandem could achieve greater outputs and thus have a bigger impact on the cholera prevalence rate.

A second output is a conceptualization of how short-term responses can be linked to long-term development goals (i.e., SDGs). Through the creation of the model, five critical external factors were revealed that significantly influenced humanitarian aid, and subsequently the cholera epidemic in Yemen (see p. 205 of Article #2). Being external factors, they could not be controlled; humanitarian organizations could only try to mitigate their effects *ex-post facto*. However, their impacts would not be as detrimental if sectors in the country were better developed and maintained. For instance, the lack of infrastructure in the country refers to non-functioning or nonexistent transportation networks, water and sanitation facilities, banking systems, and a vulnerable power grid. While the conflict further damaged what little infrastructure existed, the lack of initial development created a low threshold against disruptions. Therefore, while markets demonstrated resilient characteristics in their

ability to adapt to the volatile environment (Nimkar, 2021), long-term resilience against disruptions is difficult to achieve as it would require a sustained and collaborative effort for development, which is not yet present. This further implies that the cost-efficiency and effectiveness of humanitarian aid will continuously be impaired in Yemen until development obstacles are overcome. This includes both CVA and in-kind responses, as both rely on cross-border supply chains for operability. The supply chains themselves are vulnerable to disruptions due to conflict, which contributes to the lack of basic goods and services, amplifying the need for humanitarian aid. These shortcomings form complex reinforcing loops which perpetuate the situation. For these reasons, the SDGs were incorporated into the CLD model as targets to link short-term development objectives to long-term goals (see Figure 2 and Table 6 of Article #2).

For this linkage to occur, humanitarian development activities must be directed toward emergency preparedness to enhance disaster response. This requires effective coordination and communication between public, private, and non-governmental actors before, during, and after disasters. Unfortunately in protracted crises, this is extremely difficult to achieve, especially in contexts such as Yemen where there is a lack of trust between actors (Nimkar, 2021). But even the formation of small networks, such as cash working groups, can be advantageous for developing local capacities and capabilities, which contributes to disaster preparedness. This concept of linking developmental initiatives and disaster preparedness measures as an *ex-ante* strategy is further explored in Paper#3.

4.3 Article #3

The third article in this study draws upon implications from the two preceding studies. Specifically, the CVA's growth and expansion have underscored the need for better preparedness measures (Article #1), and in order to do so, capacities and capabilities need to be developed in the local context (Article #2). However, extant literature does not specify *how* these measures can be developed. Thus Article #3 explores what *preparedness* means for CVA programming, how it impacts operations, and why it is needed. Article #3 is a book chapter, therefore it presents information in a slightly different format than a journal article. Since the chapter is targeted toward a broad humanitarian audience, it first defines the basic elements of CVA programming and then emphasizes the importance of developing preparedness measures to ensure programmes

are designed and implemented effectively. A case study is used to provide an additional layer of depth and meaning to the chapter by presenting a relevant and practical example (Ellram, 1996; Yin, 2012).

The first step was to define ‘CVA preparedness’, as several interpretations exist in the literature. For this study, an inclusive definition was adopted which synthesized the two most common approaches, that CVA preparedness is both understanding what the minimum requirements are for implementing CVA programmes as well as integrating CVA responses into existing disaster preparedness plans so that it can be considered alongside other responses. Using this definition as a lens, CVA operational guides were reviewed from organizations with the highest CVA expenditure (e.g., RCRM, UNHCR, UNICEF, WFP, and CALP Network Partners), and their major steps and required activities at each step were compiled to form Figure 3 and Annex 1 of Article #3.

Through this review, three CVA preparedness assessments were developed to assist organizations with identifying gaps in their preparedness procedures (Table 2, 3, and Annex 1 of Article #3). The analysis of existing operational procedures across humanitarian organizations demonstrated a lack of standardization within the sector. Thus, the activities listed in Annex 1 represent a list of minimum common activities noted in each of the operational guides. Tables 2 and 3 were designed to help organizations inventory their capacities and capabilities on the individual and team levels, which affect the organizational level. These tables are supplemented with Figure 4, which represents the hierarchical relationship for developing capacities, capabilities, and competencies in an organization. Thus, an organization’s ability to deliver CVA is dependent upon available capacities and acquired capabilities at the time of an event, which requires advanced training and preparation. This approach follows the ‘resource-based view’, which infers that the number of resources allocated to an activity will affect outcomes in an open system (Sanchez & Heene, 1996).

The case study further extended the findings to reveal that capacities, capabilities, and competencies also exist on the network level and that information-sharing networks can be leveraged for the development of skills and knowledge. At the organizational level, only three of the five organizations in the CWG had previous CVA experience in Mexico, and only two of those organizations had dedicated CVA staff (see Table 4 of Article #3). Thus, there was a large disparity across the working group concerning CVA capacities and capabilities. However, when

conducting a joint-procurement action, the two organizations with the most experience led the exercise and sought feedback from the other organizations, encouraging learning through participation (see Figure 5 of Article #3). The two organizations with no CVA experience intended to use the contract established from the joint tender to operate their own pilot programmes. Both reported feeling more confident that the contract was established through a common procurement action so that the CWG could offer advice and feedback if barriers arose during implementation. They also acknowledged that it was a significant resource-saving strategy for their team, as procurement is one of the more resource-intensive and challenging processes for humanitarian organizations (Moshtari et al., 2021), especially for acquiring financial services for vulnerable populations. The findings at each level of the network are summarized in Figure 9.

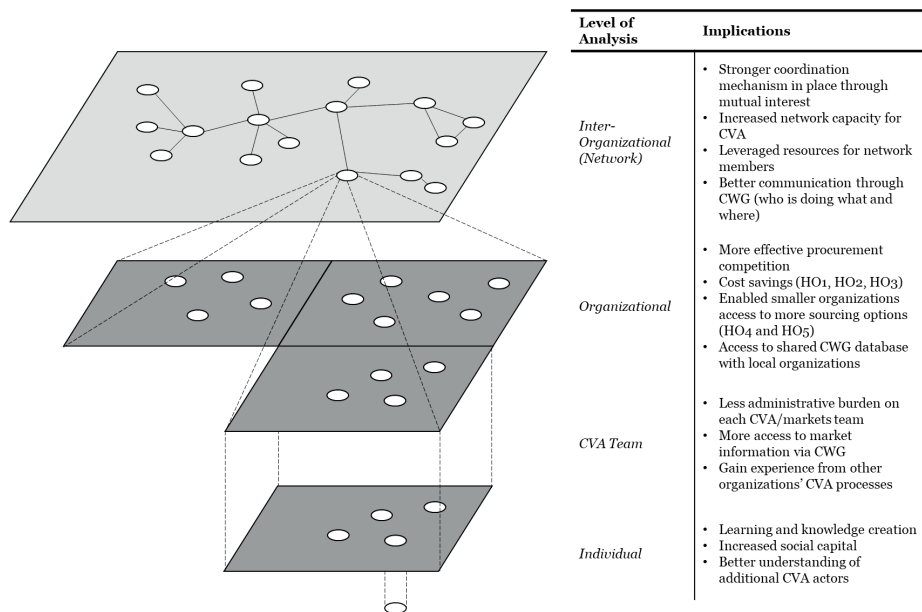


Figure 9: Findings from the Mexico CWG at different levels of analysis.

Additionally, the case study exemplified how collaborative networks can create information-rich environments. When the five organizations came together to form the CWG, they agreed to create a common database of known local and national financial service providers. These providers specialized in different delivery mechanisms and operated in different regions. Although the scope of the joint procurement action was limited

to national FSPs only, representing a small fraction of the database, each organization was permitted to use the entries in the database for their individual projects. Accordingly, time could be saved when conducting market research activities and stronger relationships could be established with local actors, who often have contextual knowledge in the areas of implementation.

Through the analysis of the literature and presentation of the case study, Article #3 addresses two commonly mentioned gaps in humanitarian responses, preparedness and collaboration. Linking them together demonstrates how information sharing can enhance responses on the network level but relies on the continual development of organizational capabilities and capacities. On the organizational level, this requires an investment of resources and training of individuals, which can increase the overall state of preparedness. If better preparedness does indeed lead to better responses and information sharing across networks can act as a form of preparedness, then this study suggests that organizations should form collaborative networks at the local level for more effective responses.

5 CONCLUDING DISCUSSION

A problem never exists in isolation; it is surrounded by other problems in time and space. The more of the context of a problem that a scientist can comprehend, the greater are his chances of finding a truly adequate solution. (Ackoff, 1962, p. 420)

The overarching aim of this thesis is to develop a better understanding of how CVA effectiveness and efficiency are influenced by supply chains and networks in different contexts. Adopting a systems perspective provided a holistic perspective of the humanitarian aid system, recognizing that CVA was a component of the system subject to interactions between the internal entities in the system as well as the exogenous factors exerting pressure on the system. The three individual studies conducted for this thesis explored different aspects of the overarching research problem. By building on one another, the studies In this final section, the findings of the three studies are used to answer the four research questions raised in Section 1, as well as the implications they have related to the overarching research objective.

5.1 Key findings and contributions

RQ 1 How does supply chain functionality affect CVA feasibility?

For CVA to be considered, goods must be available and accessible in marketplaces. These items rely on humanitarian and commercial logistics for demand to be met with supply. Article #1 addresses this question by first looking at the content of humanitarian supply chains in CVA operations: the actors, their objectives, and the goods and services they intend to deliver. The process of delivering CVA is shaped by the context, supply-side and demand-side determinants, and the operational capabilities of each organization (see Table 3 of Article #1). In Article #2, the contextual factors which enabled and constrained the delivery of aid were further mapped out, revealing the crucial link between supply chain functionality and the level of infrastructure development in the country of operation. These constraints not only affected the flow of goods, but the flow of money as well through the lack of banking and financial infrastructure. Therefore, in addition to goods and services being available and accessible in the marketplace, beneficiaries must also have access to financial services, which partly relies on the extant infrastructure and partly on the capability and capacity of the local suppliers and financial service providers.

In Articles #1 and #3, the capabilities and capacities that enable CVA are further explored, underscoring the importance of information flows in supply networks. Article #1 identifies these capabilities in the extant literature and Article #3 investigates how organizations can develop these capabilities as preparedness measures. The case study in Article #3 demonstrated that CVA can be a feasible option without full inter-organizational expertise by relying on resources from other organizations. Information exchange and knowledge sharing, therefore, reduce the burden of resource-intensive processes, such as market mapping and procurement, on smaller organizations. While ‘piggy-backing’ on a contract may reduce operational flexibility for the implementing organization in terms of choice of FSP and delivery mechanism, it still provides the organization with the ability to respond with CVA.

RQ 2 What supply-side factors contribute to the relative effectiveness and efficiency of CVA programmes?

If CVA is a feasible choice which can be sustained in disaster response, then it must also demonstrate that it is advantageous compared to other modalities before being selected. First, it must be acknowledged that both

efficiency and effectiveness measures rely on inputs and the processes by which the inputs are utilized. As noted in the extant literature, no standard mechanisms exist that measure CVA programmes, including how to measure inputs, outputs, and outcomes. Therefore, this question is approached with respect to measures of cost, time, and accuracy. Second, the fact that CVA is an umbrella concept constituting multiple delivery mechanisms must be considered, as each comes with tradeoffs relative to the three measures, as shown in Table 5 of Article #1. These considerations are a derivative of the embedded supply chain structure in the operational context, with measurable and immeasurable components, therefore measures can only be used as an initial indicator. Third, these measures are *relative* to the implementation context and are subject to spatial and temporal dimensions of that context (Ryckembusch et al., 2013; Tappis & Doocy, 2018), which drives programmatic features and further justifies the systems perspective as it can address these constraints qualitatively.

Cost-related measures are the most commonly used among the three measures, as it is perhaps the easiest to objectively measure given that the commodity being transferred is money. Article #1 identified studies that have measured the cost-efficiency and cost-effectiveness of CVA and found that it can be greater than or equal to that of in-kind aid across different contexts (e.g., Margolies & Hoddinott, 2015; Ryckembusch et al., 2013; Tappis & Doocy, 2018). However, the investigation into *how* supply chains affected those measures revealed a more nuanced answer. For instance, it is often cited that the reduction in logistics activities improves cost-efficiency (Doocy et al., 2011; Heaslip et al., 2018a). However, the effect on cost-efficiency depends on the scale of the intervention and local market conditions. For instance, Article #2 details how damage to infrastructure disrupted logistical activities and inhibited the general cost-efficiency of aid, despite the scaling-up of aid. Other studies also note that logistical costs may be shifted to other internal functions, or even to other actors in the network, including beneficiaries (e.g., García Castillo, 2021; Piotrowicz, 2018). Other studies from Article #1 mentioned that additional costs were absorbed by the humanitarian organization, but were not explicitly mentioned in the calculation of the total cost. Furthermore, Article #3 notes that some costs, such as those for training, cover multiple programmes, while other costs are programme-specific. How these funds are allocated in an organization's budget may affect the calculation of total input costs, as it is not conclusive whether these costs are carried over when calculating the total cost of ownership of a delivery modality.

Despite these concerns, several supply-side factors were noted to have a positive impact on cost-efficiency. First, investment in skills and training can create a positive moderating effect on outputs through a more capable workforce. Knowledge is gained and retained, which can be carried over to subsequent programmes. Still, it was noted in Article #2 and Article #3 that despite the potential long-term positive impact training may have on programming, the high initial cost may be a deterrent for organizations to invest in capacity-building activities. Article #3 in particular contributes to this discussion by demonstrating the power of networks and partnerships. Second, multiple studies identified in Article #1 demonstrated potentially high savings through the digitalization of CVA. Third, studies from the literature review also discussed how unconditional cash assistance enables more needs to be covered under one contract, reducing the total number of contracts and logistics activities needed – at the very least saving on overhead costs and human resources (e.g., Jahre et al., 2018). Finally, increasing programme scale through multi-purpose cash assistance and inter-agency collaboration can reach more beneficiaries and reduce the cost per output, as most programming costs are fixed rather than variable.

While cost-effectiveness is less controllable than cost-efficiency, it is perhaps the more valuable metric for humanitarian organizations. Meeting affected populations' needs is ultimately the *raison d'être* of humanitarian organizations. Therefore, being able to do more with fewer resources theoretically extends the overall effectiveness of humanitarian aid. Unconditional cash transfers and multi-purpose cash grants align with this objective and can enable more needs to be potentially met through one form of aid. When coupled with digital platforms, money can be transferred rapidly into the hands of beneficiaries. This results in a demand-driven approach, sharing the responsibility of effectiveness with the beneficiaries themselves. This transfer of purchasing power and trust in affected populations is ultimately the crux of CVA, as it enables them to help themselves. Ancillary support can then be provided by humanitarian organizations to ensure markets can supply critical goods and services

Time-related factors were subject to internal decision-making *vis-à-vis* the adopted strategy to approach the context. Agile responses are essential to humanitarian operations (Falagara Sigala et al., 2020), but also depend on the urgency of needs of the affected population, the phase of the disaster management cycle, and available resources. If time is most critical in the immediate aftermath of a disaster, then

organizations will opt for solutions which can be delivered rapidly to maintain an efficient response. Thus, timeliness is primarily dependent upon supply-side preparedness activities. For supply managers, this means having contracts established with FSPs, critical markets mapped, and the capacity and know-how to conduct rapid needs assessments. If CVA solutions are not ready to deploy, then other modalities may need to be considered, as Article #1 and Article #3 indicate that sourcing, procurement, and implementation require sufficient time and resources. Once those activities are completed and CVA programmes are set up and implemented, money can be transferred rapidly, requiring less lead time per distribution compared with commonly procured in-kind goods. Thus, similar to cost-efficiency, CVA requires a heavier initial investment of resources but the scale can be increased efficiently after the initial investment.

Delivering rapid responses at scale requires quality control in programming (Jodar et al., 2020). Compared to cost and time, quality is less measurable and harder to quantify in terms of the efficiency and effectiveness of CVA programming. The causal loop diagram developed in Article #2 further reveals the difficulty and limitations of quantification in humanitarian operations. Depicting the response to the cholera outbreak in the context of Yemen demonstrates the complexity involved in trying to measure the quality of the total inputs, outputs, and outcomes of a programme. However, compared to timeliness, quality relates more closely to effectiveness than efficiency through the accuracy and precision of programming. While the model could not, for instance, deterministically state how CVA and in-kind interventions affect the cholera prevalence rate, it did provide a visual representation of the critical supply structures which provide assistance to affected populations. Understanding compounding factors and their effects on populations may help improve the accuracy of beneficiary targeting, ensuring they receive the goods that are actually needed. In Yemen, this also meant that beneficiaries understood the necessity of interventions (i.e., immunization campaigns), which means that beneficiaries must be involved in the programmatic design. This relates to the findings from Article #1, citing the arguments from García Castillo, (2021) and Vogel et al., (2022), that effective programming begins with a beneficiary-centred approach to understanding the actual versus perceived needs of the affected populations.

Moreover, the quality of programming depends upon establishing the right objectives in line with the needs of the population, which will

measure effectiveness. While each organization determines its objectives based on its mandates, Article #1 discussed how the alignment of supply chain strategies throughout the network of actors may increase trust and reduce redundancies between organizations, thus improving efficiency and effectiveness on the network level. This was observed during the case study for Article #3, as the members of the CWG openly shared their current and planned CVA projects, which could help identify gaps in coverage and reduce the possibility of duplication.

RQ 3 How do risks presented by the external environment in humanitarian contexts affect supply chains critical for CVA operability?

Both *ex-post* and *ex-ante* risks affect CVA operations. *Ex-post* risks primarily affect the feasibility of programming, while *ex-ante* risks primarily affect operability from the design phase onward. Section 2.3.1, briefly covers the types of risks present in CVA programmes, so this research question investigates those risks from a supply chain perspective. The case study in Yemen (Article #2) provides an extreme example of the threat external risks pose to supply chains. In the case study, the conflict situation, under-developed infrastructure, extreme natural hazards, cultural norms, and market (in)stability created a series of causal, second-order effects which ultimately resulted in a lack of basic goods and services, and reliance on imports and informal networks to meet needs. While some of these events are specific to conflict situations, others are more general to humanitarian crises. For instance, the model could be modified to fit the COVID-19 outbreak to explore the potential impacts it would have on the beneficiary population. Therefore, causal loops in the diagram may be archetypical of other humanitarian disaster scenarios, such as extreme weather events coupled with underdevelopment, which can be modified and adapted as needed.

In this sense, using qualitative methods can complement extant decision-making tools (such as decision trees and checklists) to investigate *why* a problem is occurring. For instance, if markets are failing, mapping out the context may act as a diagnostic measure to reveal the interconnectedness between actors and events, potentially providing evidence of root causes or problematic feedback loops. Responses can then be built around these risks.

Recent global supply chain disruptions have demonstrated that even the commercial sector is not immune to shocks. CVA depends on both humanitarian and commercial supply chains, requiring a combination

of logistics and finance skills to operate and monitor programmes throughout their lifecycle. Each paper referenced the need to develop preparedness measures and consider hybrid solutions to form a buffer against unexpected disruptions. Setting up cash and in-kind responses may be time-consuming and costly, but might also be the best way of providing aid in challenging contexts and conflict situations, where flexibility is desired (Article #2). Continuous supply chain monitoring can allow for disruptions to be detected more quickly, and programmes adjusted accordingly. Sharing of monitoring and evaluation reports across one's supply network can enhance the overall response of many organizations to one event and develop resilience to future emergencies in the local context (Article #1).

RQ 4 How can humanitarian organizations better prepare for CVA programming?

The answers to RQ1-RQ3 have all underscored the need for better preparedness across the humanitarian aid system for CVA programming. As Article #3 highlighted, for CVA to be routinely considered in humanitarian response plans, it must continuously prove that it is feasible, operable, safe, and more effective than in-kind assistance, which remains the primary and default mode of assistance. For this full integration to occur, preparedness actions must become the cornerstone of programming.

The literature review indicated both the sector's call for better CVA preparedness measures, but without an action plan. Part of this stems from the fact that preparedness is not a state of being in which an organization exists, but a series of actions that can continuously be undertaken at any given point in time. An organization may be prepared to deploy CVA at a moment's notice, but that does not mean it should not seek further improvement for advanced planning and swift execution. As explained in Article #3, a continuous preparedness feedback loop exists for CVA in which capacity-building activities influence programming outcomes, and learnings from outcomes can better inform future programming.

The findings suggest that preparedness is just as much about being aware of one's position and role in the humanitarian system as it is about investment in training and programming. Activities such as trust-building, networking, and supporting localization efforts can also be forms of CVA preparedness in that they strengthen humanitarian networks, which is a critical component of collaboration in delivering

responses. Within a network (such as a cash working group or cluster), activities can be parsed out to different members, reducing the overall burden on a single organization. The case of Mexico demonstrated how three organizations were able to initiate their own CVA programmes by relying on more experienced organizations to lead processes requiring technical expertise. However, they may in turn contribute through market-monitoring activities, which require less technical expertise, but an investment of time. Each member contributing their share of the work builds trust within the group, which may improve responsiveness when it is needed.

Article #3 supports the notion of investing in capacities and capabilities, with Figure 4 illustrating the connection between resources and organizational competence. As individuals' capabilities increase, so does an organization's overall capabilities, which can lead to the development of organizational competencies with time and experience. In this regard, training and development contribute to preparedness for CVA programming, expanding an organization's available capacity, and thereby providing an opportunity for greater efficiency and effectiveness.

5.2 Theoretical contributions

This research contributes to the growing body of literature in the HSCM discipline by exploring applications of CVA through a systems perspective. First, the primary contribution is its holistic perspective of CVA as a component of the humanitarian aid system and its relationship to supply chain and logistics concepts. It builds upon previous research (e.g., Heaslip et al., 2018a) to provide a more comprehensive understanding of how supply chains enable the use of CVA by addressing the interrelationships between system entities, how they influence processes, and ultimately how they create different combinational outputs. Much of the extant literature has demonstrated the efficiency and effectiveness of CVA by analyzing outputs against other modalities (e.g., Bastagli et al., 2016; García Castillo, 2021; Margolies & Hoddinott, 2015; Piotrowicz, 2018; Tappis & Doocy, 2018), which allows this research to elaborate on the causal mechanisms that enable CVA programming in various contexts.

Additionally, the thesis adds to the discussion of how a systems perspective can be applied to address complexity in humanitarian responses (Heaslip et al., 2012; Obrecht et al., 2022; Schiffing et al., 2020). The system-based approaches used in each paper, namely the content-context-process framework (Article #1), causal loop diagrams

(Article #2), and resource-based view (Article #3) all demonstrate the connectedness of system components at different levels of analysis. Each of the three articles provides a unique analysis of these components and their effects on efficiency and effectiveness in the humanitarian system. Efficiency is more dependent upon internal organizational mechanisms and interrelationships, while effectiveness transcends the organizational level and requires contributions from the network of actors, including beneficiaries. Furthermore, this links concepts from HSCM to disaster management and humanitarian assistance literature by exploring how supply-side determinants and demand-side constraints affect the availability of goods in markets, and access to markets, respectively.

Second, by addressing humanitarian aid as a complex social system, this research expands upon the works of Choi et al. (2001), Day (2014), and Schiffling et al. (2020) by describing how individual entities in supply networks adapt and respond in dynamic environments. The individual entities must not only have the capacity to adapt to meet the challenges faced in the context, but also must strive to improve their preparedness measures, which can lead to more resilient and flexible supply chains. In complex settings, the non-linearity and dynamism of causal forces can inhibit predictability and hinder decision-making, slowing responses. Yet, because system behaviour can be aligned with archetypes, inferences about underlying mechanisms in the system can be made. Understanding the structure of the supply network and its general behaviour can then help humanitarian organizations prepare for responses by expanding their capacities and developing their capabilities to utilize resources more effectively (Vega & Sanchez, 2017). According to Day (2014), individual adaptive capacity affects the collective ability to respond, therefore improving and diversifying capabilities as a preparedness measure may lead to a greater number of choices available to respond to complex situations. This also aligns with Ashby's law of requisite variety (1956), insofar as a robust network is more capable of providing a variety of responses at different levels and can overcome a variety of obstacles in the prevailing context. Thus, individual entities in a supply network not only constitute its overall structure but also determine its level of responsiveness and flexibility through their level of investment in capabilities and capacities.

Third, the research also points out that literature related to CVA preparedness faces similar deficiencies and challenges as that of humanitarian logistics preparedness literature, as described by Jahre et al. (2016). In light of the challenges faced, a theoretical approach for gauging capabilities and capacities is proposed. The approach

demonstrates how the resource-based view can be applied to humanitarian systems and extend beyond the organizational level to the network level. Additionally, it builds upon the proposition from Lewin et al. (2018) that expanding local networks can contribute to preparedness by offering empirical evidence from the Mexico CWG case study.

Finally, the research demonstrates how a system-wide perspective can provide insight into how the system might continue to evolve beyond the current state. Humanitarian studies have linked humanitarian aid to more durable long-term development (Mosel & Levine, 2014; Otto & Weingartner, 2013). This research contributes to this discourse, linking CVA preparedness to humanitarian responses, and responses to the SDGs, which can act as a form of preparedness, closing the loop. Focusing on notions such as resilience and preparedness requires a shift in the way humanitarian action is conceptualized, rather than a continuous cycle of humanitarian response and recovery. This research proposes that the continual development of skills at the local level can lead to more durable solutions and better equity, theoretically lessening the need for international actors to lead responses.

5.3 Practical and social implications

As this thesis approaches a problem largely grounded in practice, it also presents several implications for practitioners. First, it contributes to the empirical evidence base for CVA, which practitioners recognize as important to better understand when CVA and specific modalities can and should be used (Bastagli et al., 2016; Harvey & Pavanello, 2018; Jodar et al., 2020). It does not purport that CVA is objectively better than in-kind aid, but argues that both are mutually exclusive tools which can complement each other to provide maximal effect. Article #1 and Article #2 provide explicit information to encourage a better understanding of market dynamics and the supply chains which underpin them, while Article #3 provides a roadmap of antecedent activities and resources required to enable programming. This combination is intended to lead to better-informed decisions and more efficient, effective, and durable solutions.

Second, this thesis contributes to the ongoing discussion among humanitarian organizations on CVA preparedness (e.g., Chapman et al., 2022). Conceptually, preparedness for in-kind distribution is arguably more developed than that of CVA preparedness, as in-kind is still the go-to response in the immediate aftermath of a disaster (Piotrowicz, 2018). Both practitioners and researchers have noted the challenge of

incorporating CVA preparedness measures into those existing for in-kind in that it requires dual supply chains, which is not only difficult to establish but time and resource intensive as well. The findings from this thesis do not refute the claims of resource usage for preparedness, but argue that it does contribute to more efficient CVA delivery during disasters. Thus, preparedness for CVA not only has the potential to improve cash-based responses but may improve responsiveness overall if humanitarian organizations have both options at their disposal.

Additionally, this thesis advocates for better use of one's social network to build capacities and share information. This may be especially applicable to smaller organizations with limited resources who still need to adhere to the stringent assessments, procurement processes, and financial regulations that large organizations do. Through collaborative efforts, such as working groups, communities of practice, and partnerships, organizations can reduce the amount of redundant work being done by working together toward common macro-level goals, and then using their individual expertise to accomplish specific tasks related to mandate and mission.

Finally, the objectives of this research aim to contribute to the UN Sustainable Development Goals (SDGs) by aiming to reduce poverty (SDG #1) and eliminate hunger (SDG #2) through increasing economic growth (SDG #8) and improving infrastructure (SDG #9). The UN SDGs offer a common framework with which all organizations can align their objectives towards. While this thesis is only a figurative drop in the bucket, it aims to be in solidarity with other research projects toward a common set of goals.

5.4 Limitations

In carrying out this research, several limitations were recognized. These limitations are a result of two factors, 1) data availability in humanitarian contexts and 2) the chosen research approach to the thesis. Additionally, each study included an individual set of research limitations, which can be found in each respective paper.

As noted in Section 3, data in the humanitarian sector is often difficult to capture, time-dependent, and incomplete. The second and third studies were each shaped by single case studies, which limits the extent to which findings can be generalized across other contexts. However, critical realist philosophy argues for pathways to recontextualize information, not for the discovery of definite truths, but to deepen knowledge about individual

events as well as theories of general structures. While individual results may have varied if different or multiple cases were studied, they still would have provided information about the general underlying structures in CVA programming which inhabit the ‘real domain’. The gradual testing, modifying, and applying of theory to new contexts brings a better understanding of known occurrences by viewing them from a different perspective (Danermark et al., 2005). Therefore, while there is a limit to the abstraction of findings from this research, it still provides value to the general understanding of the relationships that exist between SCM and CVA as concepts.

Second, the adopted approach was limited by its qualitative nature and systems perspective. Often, systems thinking, and system dynamics, in particular, are associated with quantitative research and reveal their power through quantification. Adding a quantitative element would allow for a range of other techniques to be considered, which would add another layer of analysis to the study. However, for this research, the adopted methodology guided the data collection and quantitative methods were ruled out.

Finally, the research was conducted during a time of rapid advancement in CVA technology and with dynamic changes in the humanitarian sphere. Notably, Article #1 and the majority of Article #2 were written pre-COVID-19 and at a time when CVA became increasingly digitized. It may be argued that COVID-19 has forever changed the way we conduct global operations, including in the humanitarian sphere, but more evidence would be needed to specify these claims, especially related to the impact on digital transfer mechanisms. As research in this field continues to evolve due to global events, additional studies may complement the findings in this thesis or question certain claims made therein.

5.5 Future directions

In conducting this research, several more research questions were raised that require further investigation and should be taken forward. First, a more conclusive argument could be made following a longitudinal study of the effects of CVA. On the organizational side, a contribution to literature stands to be made concerning the time it takes for organizations to acquire CVA skills, implement, monitor, and evaluate a programme – and what effects it has on subsequent implementations. The investigation conducted for Article #3 showed varying assumptions from practitioners regarding how long it might take to develop CVA skills and the degree of difficulty of programming. This learning curve

for CVA could shed light on optimal training and scaling up of CVA, which is needed considering the growth of the sector. Furthermore, it can set realistic expectations for organizations when they wish to begin engaging with CVA and encourage them to seek partnerships with other organizations for mutual benefit.

Second, the question persists of *when* is the optimal time to switch from CVA to in-kind and vice versa. Retrospective market data provides information about the effects of supply chain disruptions on humanitarian aid, which prompts the question of whether there could be a theoretical threshold which signals *when* to switch and *how* such a switch could take place. The lead times associated with both in-kind and CVA deliveries, and the fact that programmes cannot be disabled instantaneously would imply advanced planning and forecasting. Furthermore, this may depend upon supply chain resilience when faced with disruptions and market dynamics during disasters, both of which are subject to unpredictability. Addressing this further could yield benefits for CVA and the delivery of humanitarian aid in general.

Third, more investigation is needed to understand optimal transfer size and timing. As programmes continue to increase in scale, there is a potentially large upside when considering economies of scale. However, needs are not equally distributed throughout the disaster management cycle and responses should be formulated to meet needs. Cash transfers are modelled after the financial sector's *modus operandi* for recurrent transfers, which may not be the most suitable for humanitarian responses. Therefore, it may be questioned whether variable timing and amounts can lead to better responsiveness or increased effectiveness.

Fourth, Article #3 revealed the formation of networks still occurs on an *ad-hoc* basis. More information is needed to better understand how networks grow, expand, and contract across different levels (e.g., local, regional, national, and global). Information sharing in these networks can affect sourcing options, procurement activities, and contract agreements, as well as enable better collaboration with local partners. As the humanitarian sector continues to encourage partnerships (e.g., through SDG #17), more knowledge about the power of networks and how their structures affect the power can contribute to the localization effort being advocated for in the sector.

Finally, Article #3 demonstrated that CVA programmes can take advantage of infrastructure laid down by existing social safety nets and improve upon that infrastructure. Thus, there exists a need to integrate

CVA programming with social protection programmes in-country. This would theoretically contribute to CVA preparedness and allow for a smoother transition from disaster relief to recovery and development. It could also help facilitate a linkage between humanitarian aid and development, by aligning short-term objectives to longer-term goals, such as the SDGs to create more durable solutions. In doing so, perhaps it would be more beneficial to view disaster management as a continuum, rather than a cycle, with continual development being the long-term goal of any operation.

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APPENDIX 1

Article #1

Maghsoudi, A., Harpring, R., Piotrowicz, W. D., & Heaslip, G. (2021). Cash and Voucher Assistance along Humanitarian Supply Chains: A Literature Review and Directions for Future Research. *Disasters*, 47, 42–77. <https://doi.org/10.1111/disa.12520>

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Cash and voucher assistance along humanitarian supply chains: a literature review and directions for future research

Amin Maghsoudi, Russell Harpring, Wojciech D. Piotrowicz, and Graham Heaslip¹

This study reviews research on cash and voucher assistance (CVA) by applying a humanitarian supply chain management perspective. A systematic literature review was conducted to identify, analyse, and synthesise past academic research. The content, context, and process framework was used to structure the content analysis. The findings reveal that the outcomes of CVA programmes are dependent on critical context-specific variables that influence feasibility and operability. Humanitarian actors must consider factors that are external (the nature of disaster, politics, economy, and infrastructure) and internal (local market availability and accessibility, supplier/donor interest, supplier/vendor selection and contracting, and beneficiary preference) to the supply chain. The delivery process is influenced by them, impacting on programme responsiveness and cost-efficiency. The results provide insights that humanitarian practitioners can utilise to reconsider their supply chain strategies when deciding on the selection and implementation of CVA programmes. Potential literature gaps are identified, and recommendations for further research are provided.

Keywords: cash and voucher assistance, disasters, financial service providers, humanitarian logistics, literature review, supply chain management

Introduction

The use of cash and voucher assistance (CVA) in humanitarian contexts is expanding globally. More than USD 5.6 billion was distributed under CVA programmes in 2019, up from USD 2.8 billion in 2016, accounting for 17.9 per cent of all international humanitarian assistance (Jódar Vidal et al., 2020). The increase has attracted the attention of humanitarian actors (HAs) in terms of the applicability of CVA in different settings (Barrett et al., 2009), especially with respect to cost-efficiency and cost-effectiveness (Harvey, 2007). CVA refers to the provision of cash transfers or vouchers to targeted populations as a form of humanitarian assistance. This differs from the traditional 'in-kind' form of assistance, which entails the supply of physical goods (such as clothing, food, medicine, and shelter) to targeted populations. Logistical expenditures associated with in-kind distributions may account for nearly 80 per cent of the total costs of a disaster relief operations (Van Wassenhove, 2006). As CVA does not require the same transportation, warehousing, and distribution services as in-kind

assistance, the potential for greater operational efficiency and effectiveness swells (Margolies and Hoddinott, 2015).

While it is important to recognise CVA as another ‘humanitarian tool’ in the toolbox, and not a ‘one-size-fits-all’ solution (Wilson et al., 2018; Brennan et al., 2019), there has been an increase in CVA over the past two decades. Despite this expansion, there is still a lack of exhaustive understanding as to when, where, and how CVA can be best delivered to beneficiaries in both development aid and humanitarian relief environments. Although overlaps exist between relief aid and development work, this review focuses on the application of CVA in relief situations. Extant literature on CVA has explored the cost-effectiveness, efficiency, and social protection outcomes of different modalities across various humanitarian sectors (see, for example, Barder et al., 2015; Bastagli et al., 2016; Tappis and Doocy, 2018). However, insufficient research has been conducted on the logistical aspects of delivering CVA and how local supply chains influence CVA operations (Lewin et al., 2018).

This study examines, therefore, the literature related to CVA programmes and its interconnection with humanitarian supply chain management (HSCM) research. A systematic literature review (SLR) was undertaken to identify, assess, and synthesise academic literature in a rigorous and repeatable manner (Tranfield, Denyer, and Smart, 2003). The content, context, and process (CCP) framework, originally developed by Pettigrew and Whipp (1993), was used to structure the evaluation and to categorise the findings. The framework was adopted to comprehend how programme outcomes are influenced by the *who and what* (content) of CVA and HSCM, *where and when* (context) interventions occur, and *how* (process) delivery is made possible (Pettigrew, 2012). Applying the CCP framework extends current HSCM theoretical frameworks, which describe the internal and external interfaces between actors along humanitarian supply chains and their direct and indirect effects (see, for example, Prakash et al., 2020). Accordingly, the following four research questions were formulated:

- **RQ1.** Who are the main supply chain actors for CVA programmes? (Content-related.)
- **RQ2.** Which context-specific factors form feasibility criteria for CVA programmes? (Context-related.)
- **RQ3.** How are CVA programmes delivered to beneficiaries? (Process-related.)
- **RQ4.** What are the outcomes of CVA delivery processes? (Outcome-related.)

Providing comprehensive answers to the above research questions contributes to theory and practice by developing a clear understanding of (i) the key actors through which CVA is coordinated, (ii) the context-specific factors that act as feasibility criteria with respect to their supply chains, (iii) the logistics of the delivery process, and, lastly, (iv) the expected outcomes of the delivery of CVA programmes in a humanitarian setting.

This paper is composed of seven sections. Section 2 explains the research methods used for the SLR; section 3 presents a descriptive and thematic analysis of the content, as well as noting gaps that remain in the literature; section 4 discusses the

findings and sets out recommendations for studies in the future; section 5 highlights the contributions of this research to CVA and HSCM; section 6 points out the limitations of the research; and section 7 contains some concluding remarks.

Methodology

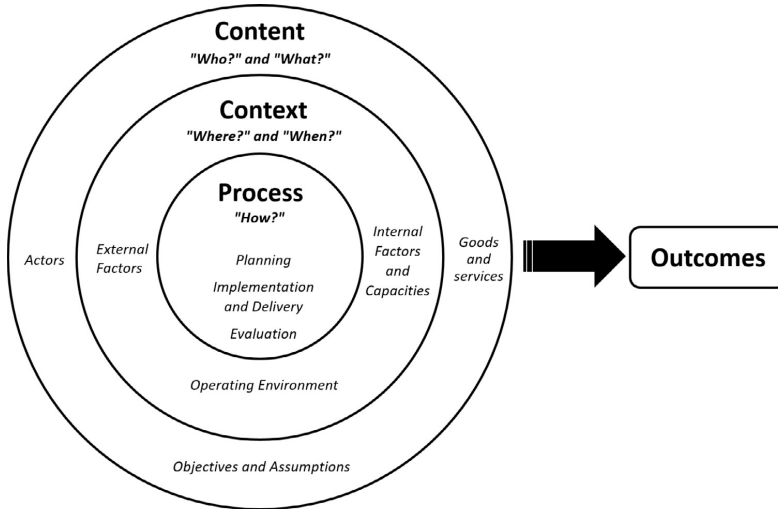
An SLR follows a structured format to collect, synthesise, and analyse information related to a specific topic in a rigorous and repeatable manner (Tranfield, Denyer, and Smart, 2003). The method has proven effective in narrowing the ‘knowing–doing’ gap between research and practice (Rousseau, Manning, and Denyer, 2008). Furthermore, SLRs have been recommended for studies in the field of supply chain management (SCM) to describe the influence exerted by the internal and external environment (Durach, Kembro, and Wieland, 2017). Similarly, CVA programmes are impacted by socioeconomic, political, and environmental factors (Harvey, 2007).

The research utilised deductive and abductive approaches to conduct the search and the analysis of content, respectively. During the searching and screening processes, a deductive approach was exercised by applying criteria to the sample of literature to decide whether or not to include it. In contrast, the analysis and synthesis phases applied an abductive approach to generalise information and to identify peculiarities within the selected studies (Kovács and Spens, 2005).

In the analysis, the CCP framework provided structure for the categorisation and coding of information to appraise the factors that influence CVA in HSCM and to understand their effects on outcomes (Pettigrew, 2012). It was adapted in previous studies to perform analyses in areas such as patient care (Stetler et al., 2007), information systems evaluation (Stockdale and Standing, 2006; Piotrowicz and Irani, 2010), supply chain performance measurement systems (Cuthbertson and Piotrowicz, 2011), and sustainable supply chains (Qorri, Mujkić, and Kraslawski, 2018). The CCP framework offers a structure for the analysis by assessing a phenomenon in its context and capturing the processual changes that occur as a response to the context. Figure 1 reveals the interrelations of ‘content’, ‘context’, ‘process’, and ‘outcomes’ across the sample literature from humanitarian CVA programmes, answering *who and what* (content), *where and when* (context), and *how* (process) questions, which influence the resulting *outcome*.

‘Content’ refers to *who and what* questions: what services/products, what type of actors, and what objectives and assumptions are considered within a particular setting (Pettigrew and Whipp, 1993)? In this research, ‘content’ is related to the basic concepts, objectives, and supply chain actors associated with CVA programmes in the humanitarian setting.

‘Context’ refers to *where and when* questions, namely those factors and boundaries related to the internal and external environment of the focal organisation along its supply chain. The external environment pertains to the political, the social, the cultural, the technological, and infrastructure, over which the focal organisation does not have control (Pettigrew and Whipp, 1993). For this research, it includes

Figure 1. Context, content, and process framework

Source: authors, adapted from Pettigrew and Whipp (1993).

prerequisite 'feasibility criteria' for the implementation of CVA and supply chain functionality. The internal environment manifests through the supply chains extending from the upstream (that is, dealing with donors and financial service providers) to the downstream (that is, dealing with the beneficiaries' demand).

'Process' refers to *how* questions, meaning the actions via which CVA is delivered to beneficiaries. It encompasses the capabilities required for CVA delivery, the delivery mechanisms, and supply chain factors to consider for each mechanism. Each process mechanism (that is, CVA delivery mechanism) is chosen based on the specific context and capabilities required to perform tasks, and thus it influences the outcomes of the process (Pettigrew, 2012).

An 'outcome' is a result of the process that is under investigation (Pettigrew, 1985). Pettigrew (2012) stresses the need to analyse the influence that contextual and processual changes exert on outcomes. Likewise, there is a need to specify the outcomes, as they may refer to either intermediate or final outcomes, to determine the exact effects of the processes. The challenge is to analyse and describe the relationships between context, process, and outcome (Pettigrew, 2012).

The remainder of this section describes the key steps used to identify and compile the literature sample (based on Seuring et al., 2005).

Search and material collection

The literature sample was compiled by searching major journal databases and digital libraries that are most frequently accessed by scholars in the areas of SCM, HSCM,

Table 1. Literature sources and search terms

Peer-reviewed sources	Search terms
ABI/INFORM Collection (ProQuest), Emerald Group Publishing, Google Scholar, JSTOR, ScienceDirect (Elsevier), Scopus, Springer, Taylor and Francis Group, Web of Science Core Collection, and Wiley	Cash OR e-cash OR CVA OR CBA OR CTP OR CBI OR voucher* OR coupon* OR CFW OR MPCA OR MPCGs AND Humanitarian logistics OR humanitarian supply chain* OR disaster relief supply chain* OR humanitarian operation* OR operational relief*

Source: authors.

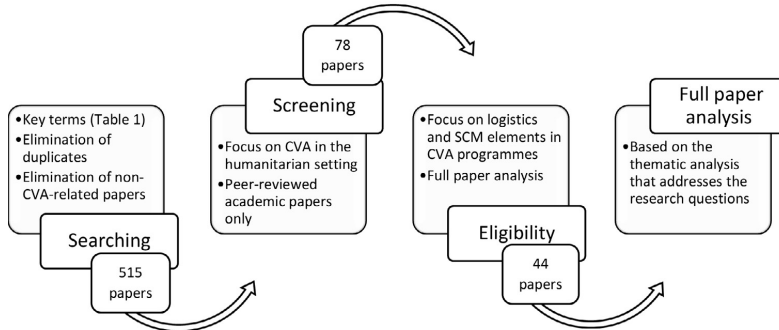
and disaster studies. The search terms shown in Table 1 were used to find matches in the title, abstract, or keywords fields (Seuring et al., 2005; Seuring and Gold, 2012). Both CVA and HSCM utilise a variety of acronyms, including cash-based assistance (CBA), cash-based interventions (CBIs), multi-purpose cash assistance (MPCA), and cash transfer programmes (CTP) for the former, and humanitarian logistics (HL) and humanitarian operations (HO) for the latter. Although these terms have been employed interchangeably, this paper uses the term ‘CVA’ for consistency and inclusivity of voucher programmes, and ‘HSCM’, noting that logistics is an integral part of humanitarian SCM. To ensure robustness of the search, all of these terms were used with Boolean operators to create search strings of text. Subsequently, only the papers with a direct or indirect connection to SCM were selected.

For search criteria, only articles published after the year 2000 were considered, as the interest in humanitarian CVA programmes began after the earthquake that struck Bam, Iran, on 26 December 2003 and the Indian Ocean tsunami on 26 December 2004 (Doocy et al., 2006). The snowballing technique was administered to identify additional sources by reviewing the reference list of each discovered article (Wohlin, 2014).

Screening

To ensure relevancy and research objectivity, inclusion and exclusion criteria were determined and agreed upon by the research team. Only peer-reviewed journal articles published from January 2000 to February 2021 were selected. The search and screening were completed by two authors, and then reviewed by two other authors not involved in the search to reduce potential bias during the process.

The initial search yielded 515 articles. After removing non-peer-reviewed articles, book chapters, and duplicates, articles were manually filtered by reading abstracts and removing those that did not pertain to CVA in the humanitarian setting, leaving 78. During the last stage of screening, the remaining articles were read in full, and those that addressed the supply chain aspects either implicitly or explicitly were chosen (see Figure 2), resulting in a final sample of 44. Following this step, a quality assessment was conducted based on the research questions, methodology, and contribution of each article to the research topic (Pilbeam, Akvarez, and Wilson, 2012).

Figure 2. Searching and screening methodology

Source: authors, adapted from Gimenez and Tachizawa (2012).

Extraction and synthesis

The final sample of 44 articles (see Table A1 in the Appendix) was systematically analysed using two separate coding structures to collect and compare quantitative and qualitative information across the sample. Table 2 displays the coding scheme, which includes both descriptive (Denyer and Tranfield, 2009; Colicchia and Strozzi, 2012) and thematic (Pettigrew and Whipp, 1993) analyses.

Table 2. Categories used in synthesising and analysing the SLR

Analysis type	Category	Information
Descriptive	Publication date	Year of publication
	Journal	Journal name
	Journal cluster	Discipline, research field
	Author	Name(s)
	Disaster type	Natural hazard, anthropogenic, complex emergency
	Disaster phase	Preparedness, response, recovery, mitigation
	Geographical scope	Country or region
	Methodology	Experiment, interview, case study, survey, archival/secondary data, modelling
Thematic	Content	Concepts, objectives, actors
	Context	External and internal factors
	Process	Capabilities, delivery mechanisms
	Outcome	Outcomes

Source: authors, adapted from Pettigrew and Whipp (1993), Denyer, Tranfield, and van Aken (2008), Denyer and Tranfield (2009), and Colicchia and Strozzi (2012).

The following data were extracted to conduct the descriptive analysis: publication year; journal name; author; disaster type; disaster phase; methodology; type of organisations involved; and geographical scope. The thematic analysis was conducted using an abductive reasoning approach, which can lead to the suggesting of general rules concerning the particular phenomena (Kirkeby, 1994). This approach helps to distinguish generalisable findings from those that pertain to specific situations arising from, for example, contextual and environmental factors (Kovács and Spens, 2005). Thus, an abductive approach can lead to new contributions to existing phenomena (that is, examining CVA from an HSCM perspective). Similarly, this approach is suitable for interpreting or recontextualising individual phenomena within a specific framework (that is, the CCP framework), and aims to scrutinise the phenomena (such as CVA programmes) in a new manner or from a new standpoint (Dubois and Gadde, 2002). Consequently, subcategories were developed for further classification.

A semi-open coding procedure was used for the thematic analysis (Miles and Huberman, 1984). In this case, the unit of analysis was each identified study. During the synthesis, considerable attention was paid to combining aspects of pragmatism (that is, what is available) with rigour (that is, what is most suitable for this research) (Churchill, 2013). For further reliability, the coding of the data was conducted independently by two authors. Following the method of Churchill (2013), strings of text that related to each research question were recorded, which could be further linked to subsequent text strings within each study, and across studies. This procedure was iterative and completed for each phase of the CCP framework, which further led to the identification of 'outcomes'. Pettigrew (2012) notes that this is a critical component of the CCP framework and is necessary to compare empirically how changes in the context and process affect the outcomes that materialise.

In relation to 'content', key concepts, objectives, and actors were identified and recorded to provide structure to the problem (Pettigrew and Whipp, 1993). This step creates a depiction of CVA programmes and their supply chain counterparts in the humanitarian setting. The humanitarian supply network concept (Kovács and Spens, 2007) was adapted to reveal which actors in the supply chain contributed to which processes.

Regarding 'context', any factors that affected the feasibility of CVA programmes from a supply chain perspective were recorded and coded manually using a colour-coded system in the database. The coding system was influenced by the model proposed by Christopher and Peck (2004), in which internal and external factors are separated to distinguish between the control a network of actors has over the supply chain (internal) versus the influential factors that are outside of its control (external). A set of codes and categories was then defined and assigned to the text to identify when patterns occurred. The codes were linked to conceptual themes and served as a working template for the next sample paper.

The same procedures were applied for the 'process' step, which categorised the delivery mechanisms and respective capabilities required for each of them. Lastly, in line with the recommendation of Pettigrew (2012), the 'outcomes' provided a

connection between the three phases: the actors perform tasks throughout the process, which are embedded in multiple layers of context (that is internal and external). In this way, outcomes holistically describe what happened, who was involved, and why and how the event happened (Pettigrew, 2012). The synthesis of information from descriptive and thematic data led to several key findings on the use of CVA within and across contexts, which addressed the research questions and led to contributions of the study.

Analysis of current CVA and HSCM literature

Descriptive analysis

The database of articles included descriptors such as the type of study, author, year, journal, methodology, keywords, and abstract. In addition, the authors adapted the phases of the disaster management cycle (Tatham and Spens, 2011) along with the type of disaster for coding. Filters were used to categorise papers based on thematic information and the research environment, permitting the identification of emerging trends and critical issues (see Table A1 in the Appendix).

Several key findings were noted on metrics from the sample of literature. First, no papers were found before 2006, and one-half of the available literature was published from 2018 onwards, denoting growing research interest. While most articles were published in supply chain or disaster management related journals ($n=30$) (see Table A1 in the Appendix), more than one-third ($n=14$) were published by other disciplines, such as social sciences, development, and policy and management studies, suggesting that the field is cross-sectorial. Of the 30 articles appearing in supply chain or disaster management journals, 20 were published between 2018 and 2020, indicating that research linking HSCM and CVA is mounting and recognition of the critical role of logistics in the planning, procurement, implementation, and distribution of CVA programmes.

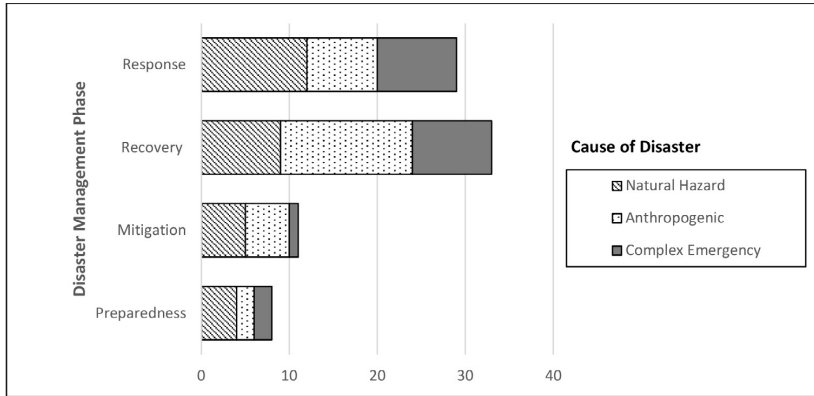
Second, the use of case studies was the most common methodology ($n=19$) and usually involved one or more humanitarian actors. Modelling ($n=8$) and archival/secondary data ($n=7$) were also utilised to expand on theory.

Third, geographic distribution indicates that 69 per cent of all papers cover one of three regions: Africa (28 per cent); Asia (22 per cent); and the Middle East (19 per cent).

Fourth, the disaster 'recovery' and 'response' phases were discussed most frequently ($n=33$ and $n=29$, respectively); less so, however, for the 'mitigation' and 'preparedness' phases ($n=11$ and $n=8$, respectively).

Figure 3 juxtaposes the frequency of disaster phases with disaster type as discussed in the sample of literature. Research assessing CVA programmes proceeding a disaster outweighs research on CVA leading up to a disaster. Based on the gathered data, CVA preparedness and mitigation measures in complex emergencies were the least commonly discussed themes. These trends are connected to the subsequent thematic analysis and discussed further in the 'discussion on the findings' section below.

Figure 3. Frequency of disaster types and respective management phases from the literature



Source: authors

Thematic analysis

This subsection presents the analysis and synthesis of the literature. The following subsections address the major findings that emerged from using the CCP framework.

Content

Concepts and objectives of CVA programmes

Throughout the sample of literature, the names by which CVA was referred to differed (such as CBA, CBI, and CTP), but the concept and objectives largely remained the same. Few authors explicitly defined CVA (see, for example, Wilson et al., 2018; Khoury, 2019), whereas others did so implicitly by referring to programmes where cash transfers or vouchers are provided to beneficiaries for commodities and services (see, for example, Kelaher and Dollery, 2008; Heaslip, Kovács, and Haavisto, 2018b). More frequently, authors referred to the specifics of CVA, such as various delivery mechanisms through which cash or vouchers are distributed, including via a smart card, mobile money transfer, cash in hand, and an ATM (automated teller machine)/debit card.

CVA is either conditional or unconditional to cover the procurement of a diverse range of goods and services, notably, food/non-food items (Sabates-Wheeler and Devereux, 2010), water, sanitation, and hygiene (see, for example, Enshassi et al., 2017; Heaslip, Kovács, and Haavisto, 2018a; Martin-Simpson, Parkinson, and Katsou, 2018), medical products (Nikulkov et al., 2016), and shelter and housing materials (Matopoulos, Kovács, and Hayes, 2014). Unconditional CVA provides beneficiaries and local market operators with greater flexibility (Burkart, Besiou, and Wakolbinger, 2016; Heaslip, Kovács, and Haavisto, 2018b) and can be used to cover multiple needs simultaneously (Sabates-Wheeler and Devereux, 2010; Tappis and Doocy, 2018).

Conditionality, however, may lead to more directed spending and to less misuse (Willibald, 2006), impacting on overall outcomes.

Each operation has defined and specific objectives in line with the priorities outlined by HAs, which are based on needs assessments and donor requirements (Maxwell, 2007). Doocy et al. (2011) and Kelaher and Dollery (2008), though, describe the early expansion of CVA programmes in humanitarian settings as to meet a greater variety of needs. Increasingly, rather than viewing CVA as an alternative to in-kind assistance, studies have demonstrated the value of offering multiple modalities alongside each other, such as CVA and in-kind assistance, to cover an assortment of needs across sectors and locales with increased flexibility and agility (see, for example, Lewin et al., 2018; Piotrowicz, 2018; Tappis and Doocy, 2018). Regardless of which modality is employed, Puri et al. (2017) state that the objectives of CVA programmes must be aligned with the aims of humanitarian operations to provide agile responses and reduce human suffering, which is dependent on the HAs involved in CVA programmes.

Actors in CVA supply chains

As CVA programmes involve different process modules than in-kind assistance, the type of actors and their role varies between the two modalities. CVA effectively alters the supply chain and actors engaged, reducing the need for the transportation, warehousing, and delivery of goods associated with in-kind humanitarian assistance (Heaslip, Kovács, and Haavisto, 2018b). Whereas physical distribution relies on third-party logistics service providers and customs clearance agents to facilitate the movement of goods (Heaslip, Kovács, and Haavisto, 2018b), CVA utilises financial service providers or payment service providers (FSP/PSP) to facilitate the flow of money. Funds pass from donors to HAs, who use an FSP/PSP to distribute them to the beneficiaries, who are then able to purchase goods and services from local markets. In this way, the flow of goods and finances is redirected along the supply chain (Heaslip, Kovács, and Grant, 2018). While larger NGOs and United Nations (UN) agencies may be responsible for programming, smaller NGOs provide critical ancillary support (Doocy et al., 2016), such as post-distribution monitoring, market analysis, and reporting. The host communities play a supportive role in the supply chain through economic and market activities (Jahre et al., 2018; Vogel, Tschunkert, and Schlöpfer, 2022).

CVA programmes aim to be beneficiary-driven but are still influenced by local governments and donors, which might have modality preferences (Maxwell, 2007; Burkart, Besiou, and Wakolbinger, 2016). Several authors note that the inclusion of beneficiaries in the supply chain was important for equity in the decision-making process (Heaslip, Kovács, and Grant, 2018; Khoury, 2019; Rao et al., 2019). However, only moderate levels of beneficiary participation when implementing CVA were recorded (Wilson et al., 2018). Other scholars point out that suppliers and donors may ultimately remain the deciding factor in modality selection (Ülkü, Bell, and Wilson, 2015; Burkart, Besiou, and Wakolbinger, 2016), despite growing concern

about beneficiary representation. Local government jurisdiction can also affect the supply and delivery of CVA through decisions on when to declare an emergency (Maxwell and Parker, 2012), beneficiary eligibility requirements (Maxwell, 2007), and the suitability of delivery mechanisms (Sabates-Wheeler and Devereux, 2010; Piotrowicz, 2018). The actors involved, and the extent to which they are engaged, are aspects often determined by the context in which the response takes place, which is discussed in the next subsection.

Context

‘Context’ dictates when and where CVA programmes can be administered in humanitarian settings and whether their objectives can be fulfilled through CVA. Thus, each situation requires a unique feasibility analysis to determine how the context will influence CVA programmes. Table 3 uses the categorisation proposed by Christopher and Peck (2004) to illustrate the context-specific factors influencing supply chains. The model was extended for this study to present feasibility criteria for each factor. Internal factors incorporate the network of actors and their influence on the supply chain and the delivery of CVA. Factors external to the network of actors and the supply chain fall under the second category and were grouped by disaster type and phase, in addition to the political, economic, and infrastructure criteria.

Table 3. Context-specific factors related to the feasibility of CVA programmes

Context-specific factors		Feasibility criteria	Articles	Frequency
External factors		The nature of the disaster (type and phase)	3, 12, 13, 15, 16, 36, 42	7
		Political aspects	2, 18, 25, 26, 36	5
		Economic aspects	1, 2, 5, 6, 7, 8, 15, 30, 36, 39, 42	11
		Infrastructure (such as the banking system and logistics)	1, 2, 3, 8, 9, 10, 11, 26, 34, 36, 37, 42	12
Internal factors	Supply-side	Availability of goods at the local market	1, 5, 8, 11, 12, 14, 15, 19, 30, 33, 37, 38, 42	13
		Market accessibility	1, 5, 8, 9, 11, 13, 14, 15, 19, 28, 34	11
		Supplier and donor interest	11, 18, 25, 31, 39, 40	6
		Supplier/vendor selection and contracting	5, 8, 9, 18, 33	5
		Supplier expertise	9, 18, 26, 33	4
	Demand-side	Beneficiary safety and choice and preference	2, 5, 8, 13, 14, 15, 21, 26, 34, 36, 37, 42	12
		Beneficiary characteristics (such as age, gender, and family size)	1, 5, 34, 36	4

Source: authors.

External factors

Several key external factors that influenced the decision to implement CVA programmes appeared across multiple studies and were recorded. These included the phase and the location of disaster (see, for example, Lewin et al., 2018; Piotrowicz, 2018; Wilson et al., 2018), together with the local economic situation (see, for example, Wilson et al., 2018; Brennan et al., 2019; Khoury, 2019) and existing infrastructure in place (see, for example, Mattinen and Ogden, 2006; Doocy, Tappis, and Lyles, 2016; Rao et al., 2019). These factors affected the feasibility of CVA programmes from a supply chain standpoint. During sudden-onset disasters caused by natural hazards, CVA may not be the best initial response due to questionable market conditions and potential economic instability (Burchi, Scarlato, and d'Agostino, 2018). However, during slow-onset emergencies that have not affected supply chains, CVA may be a better option than in-kind assistance in terms of cost and speed (Margolies and Hoddinott, 2015).

For anthropogenic (or human-made) disasters, such as a conflict, CVA feasibility depends heavily on the availability of goods as well as access to markets and services (Vogel, Tschunkert, and Schläpfer, 2022). This also suggests the existence of functioning infrastructure and markets for continuity of supplies to beneficiaries (Lewin et al., 2018; Piotrowicz, 2018). The status of a conflict also plays a role in modality selection; in areas with active fighting, HAs may face supply disruptions owing to damaged infrastructure and market access restrictions (Willibald, 2006). In such situations, CVA would not be feasible until there is a de-escalation in the conflict, and markets at least partially recover. For instance, the initial response to the conflict in Ukraine in 2013–14 was primarily in-kind assistance across the border from Poland. After establishing operations in the country and building a network with local HAs and government agencies, a combination of in-kind assistance and CVA was put into effect. In later response phases, and in calm areas where markets and prices had stabilised, CVA was preferred to in-kind assistance (Piotrowicz, 2018). Jahre et al. (2018) also support the use of CVA in later phases of a response when the operation and refugee flows have stabilised, rather than in the initial phases of a response. Protracted conflicts can also be perceived as insecure or unstable situations because of a lack of government control, which can influence the decisions to use CVA (Tappis and Doocy, 2018).

Political support, although not extensively discussed in the literature, frequently has a direct bearing on CVA programmes and their functionality (Burchi, Scarlato, and d'Agostino, 2018). Ideally, this would include aligning social support programmes with humanitarian relief (Vogel, Tschunkert, and Schläpfer, 2022). For instance, after the Indian Ocean tsunami in 2004, the Government of Sri Lanka provided additional support to ease the delivery of cash by opening bank accounts for beneficiaries (Doocy et al., 2006). Conversely, sanctions against nations or inter-governmental conflict can inhibit the utilisation of CVA as a response mechanism. In such circumstances, Doocy, Tappis, and Lyles (2016) recommend evaluating delivery mechanisms

by governorate or locale individually. Other political issues related to mistrust, corruption, and issues with anti-terrorist regulations were also mentioned as factors that may reduce the likelihood of CVA being implemented (see, for example, Heaslip, Kovács, and Haavisto, 2018b).

Macroeconomic metrics such as inflation and unemployment rates may also—directly or indirectly—impact on the modality of and the mechanism for CVA delivery (Sahinyazan, Rancourt, and Verter, 2021). Price rises of basic commodities increases vulnerability and reduces the purchasing power of beneficiaries. Consequently, inflation at the macro level is a concern for HAs as it diminishes the real value of cash assistance. CVA may also cause inflation in areas of implementation by disrupting the supply and demand balance in local markets, to the disadvantage of beneficiaries (Sabates-Wheeler and Devereux, 2010; Castillo, 2021). In some situations, CVA may serve as a supply-side intervention to provide temporary assistance to the unemployed or to assist in economic development through cash-for-work programmes (Kelaher and Dollery, 2008).

Scholars also argue that infrastructure should be assessed prior to the implementation of CVA programmes (Lewin et al., 2018), centring on two primary considerations. The first is the functionality of transportation infrastructure and whether goods can be delivered to targeted locations. But this does not always lead to implementation of CVA programmes, since the delivery of cash may also require logistics capacity, such as road infrastructure in place for cash distribution or transportation to ATMs. In addition, the beneficiaries of CVA programmes may rely on transportation to reach markets and to purchase goods. The second consideration is the functionality of banking infrastructure, which influences the extent to which CVA may be used. Heaslip, Kovács, and Haavisto (2018a) highlight the importance of local banking systems and proper capacities to employ those systems. In more urbanised areas where infrastructure is developed and people have access to telecommunications and financial systems, the potential for utilising CVA increases (Wood and Frazier, 2020). During the Syrian conflict that began in 2011, for instance, this proved effective, as CVA could support refugees residing in urban areas with adequate and functioning infrastructure (Wang, Han, and Beynon-Davies, 2019).

Internal factors

The decision that the network of actors makes exerts control over supply chains and affects CVA programming. From the supply side, a precondition for CVA is that local market conditions are favourable for all actors (such as donors, suppliers, beneficiaries, and HAs), including the availability of goods (Heaslip, Kovács, and Haavisto, 2018b) and ensuring accessibility by beneficiaries (Wilson et al., 2018). The extent to which HAs conduct market assessments can determine access and availability constraints. Donors can also influence early programmes and planning stages through their preferences and interests. These may limit the possibilities via which HAs are able to deliver responses using donor funds (Kelaher and Dollery, 2008), although one

should note that some donors prefer in-kind assistance to cash, despite the overall effectiveness of the latter.

The procurement, sourcing, and contracting of suppliers must also be strategic for CVA programming. Heaslip, Kovács, and Grant (2018) emphasise that suppliers should not be viewed as HAs, since they are profit-oriented with business interests, and they are not always willing to accept forms of payment or terms that are not in their favour. If legislative procedures and taxation policies in the country of operation do not benefit suppliers, HAs may have a difficult time in establishing contract frameworks with local suppliers and FSP/PSPs (Burkart, Besiou, and Wakolbinger, 2016). This is especially important in conflict zones, because not all suppliers are willing to operate in unstable environments. In such a context, HAs need to have a sourcing strategy and flexible contract frameworks (Khoury, 2019). Suppliers without field experience of disaster relief operations may impair CVA effectiveness, as was the case with the Housing Reconstruction Programme (2000–21) in Kosovo: the supplier's lack of experience and financial capacity led to material costs increasing by 30–40 per cent (Matopoulos, Kovács, and Hayes, 2014). Thus, suppliers with more experience and a proven track-record may be preferred (Howe and Stites, 2019).

On the demand side, only 13 per cent of the reviewed articles addressed the importance of beneficiary choice among the different modes of assistance (see, for example, Maxwell, 2007; Ryckembusch et al., 2013; Doocy, Tappis, and Lyles, 2016). Preference may depend on beneficiaries' characteristics as well, such as their residential location, gender, race, culture, and age. Increasingly, beneficiaries prefer CVA to in-kind assistance when both options are feasible (see, for example, Maxwell, 2007; Doocy et al., 2011; Castillo, 2021). Women seem to be better managers of cash (Kelaher and Dollery, 2008) and sometimes opted for in-kind assistance over CVA if the source was more secure (Ryckembusch et al., 2013). Households living far from markets, especially the elderly and those without access to transport, may choose in-kind assistance (Piotrowicz, 2018), whereas those living closer to markets prefer CVA (Cunha, De Giorgi, and Jayachandran, 2018). Furthermore, the decision to distribute cash can be time-sensitive and dependent on seasonal trends and food harvesting periods (Ryckembusch et al., 2013). It is very important, therefore, that donors and HAs observe the specific needs of beneficiaries and their preferences when structuring responses (Maxwell, 2007).

Process

'Process' refers to *how* questions, meaning the actions through which CVAs are being delivered and distributed. For each type of CVA programme, there are delivery mechanisms that facilitate the implementation of a particular solution shaped by the context (Doocy, Tappis, and Lyles, 2016; Heaslip, Kovács, and Haavisto, 2018b). While several generalities can be made about all CVA delivery mechanisms, there are also important distinctions. The subsection below examines identified capabilities, considerations from an HSCM perspective, and outcomes for the implementation of each delivery mechanism.

Capabilities

The literature underlines that certain capabilities related to internal and external factors must be in place for proper CVA programmes (see Table 4). In this study, capabilities refer to the intersection of abilities and capacities required to implement and operate CVA programmes along supply chains. While capacities related to external factors, such as infrastructure, may be beyond the control of HAs, capabilities pertaining to internal factors are required for the delivery of CVA programmes. Indeed, a lack of capabilities may lead to ‘last mile’ delivery failure, when not all beneficiaries are able to use cash (Piotrowicz, 2018).

First, implementing CVA programmes involves activities that require additional logistical skills and capabilities (Lewin et al., 2018). Each delivery mechanism has unique features, such as transfer timing and fees, market monitoring, evaluation activities, cash reconciliation, and reporting (Margolies and Hoddinott, 2015). Logistical skills could also include conducting market assessments, tendering, and partnering with FSP/PSPs (see, for example, Maxwell and Parker, 2012; Heaslip, Kovács, and Haavisto, 2018b). Following the Indian Ocean tsunami in 2004, cash-for-work programmes were implemented to aid recovery in Banda Aceh, Indonesia, but procurement and logistical issues severely limited the expansion and use of those initiatives, which eventually led to the subsequent establishment of a specialised logistics team to handle supply chain bottlenecks (Doocy et al., 2006).

Second, CVA programmes involve coordination among actors to manage and monitor visibly the flow of cash and information among the network of actors along the supply chain, creating an audit trail (Castillo, 2021). Building trust among all members of the CVA supply network is also vital for the reception of cash donations, contracting of service providers, and the facilitation and distribution of cash to beneficiaries. Low levels of trust between NGOs and donors have led to smaller amounts of cash being received by beneficiaries (Piotrowicz, 2018). And, despite increased usage of CVA, not all supply chain actors may be familiar with its functionality, potentially raising scepticism about financial transparency (Özpolat et al., 2015).

Table 4. Capabilities required for the CVA delivery

Capabilities	Articles	Frequency
Logistical capabilities for CVA operations, such as market assessment, tendering, and cash distribution.	1, 11, 12, 14, 30, 32, 33, 35	8
Trust and supplier relations (that is, with local suppliers, FSPs, informal <i>hawala</i> brokers, and donors).	2, 3, 9, 11, 12, 19, 28	7
Flexibility to adapt the delivery process.	1, 4, 11, 30, 39, 44	6
Capable of gaining access to sufficient resources (such as data, local knowledge, security, transportation, and/or technology).	1, 3, 8, 9, 23, 26	6
Capable of managing the cash distribution network and the monitoring and reporting system.	1, 4, 13, 34, 37	5

Source: authors.

Third, HAs must be capable of accessing sufficient resources for the delivery of CVA (Enshassi et al., 2017; Khoury, 2019) and should be accountable for rational utilisation of available resources (Maxwell and Parker, 2012). Coordinating efforts with local partners may enhance CVA targeting and delivery by drawing on their expertise, which also affords an opportunity to build local capacities (Doocy et al., 2016; Wood and Frazier, 2020). During some of the early large-scale CVA programmes, it became evident that capacity and resource constraints limited the effectiveness of HAs and the speed of implementation. For instance, in relation to the response to the Indian Ocean tsunami, beneficiaries first needed to be registered with proper documentation before they could receive aid, which proved to be an access constraint as they could only do so at local post offices. Consequently, to improve access, the implementing agencies introduced mobile post offices throughout affected areas (Kelaher and Dollery, 2008). Similar strategies had been employed in other contexts when beneficiaries were required to have a bank account to receive payments. In remote locations, mobile ATMs were available to beneficiaries on specific days (Margolies and Hoddinott, 2015). The popularisation of mobile money has also enhanced access in hard-to-reach places (Tappis and Doocy, 2018). In these instances, HAs were flexible in their use of internal capabilities to adapt to the external context.

Lastly, technical design and management are also required for proper handling of financial assets (see, for example, Sabates-Wheeler and Devereux, 2010), which must be accounted for through appropriate auditing, monitoring, and reporting systems for cash distribution. This can be done via cash distribution networks, making them a complementary capability for the distribution of physical items (such as paper vouchers, physical cash, ATM and smart cards, and mobile money) to beneficiaries in the ‘last mile’ (Ryckembusch et al., 2013; Piotrowicz, 2018).

Delivery mechanisms

Different processes are utilised for CVA delivery, resulting in different outcomes. Context-specific factors influence the feasibility of various delivery mechanisms in humanitarian settings. ‘Modality’ refers to the form of assistance to be provided (that is, cash, vouchers, and/or in-kind), whereas the ‘delivery mechanism’ concerns the way in which CVA is distributed to the beneficiary (such as direct cash or mobile money).

In reference to cash and vouchers as modalities, 20 articles mentioned that the use of CVA does not require the same transportation, warehousing, and distribution services as in-kind assistance. Heaslip, Kovács, and Grant (2018) note that this is due to a reconfiguration of the supply chain, within which CVA enables a ‘pull strategy’: beneficiaries purchase only what is needed, rather than goods being ‘pushed’ to them through the supply chain. This reduces the risk of irrelevant goods being provided and enables beneficiaries to determine what is needed and when to make purchases (Heaslip, Kovács, and Haavisto, 2018a; Piotrowicz, 2018; Shareef et al., 2018). Even in refugee camps, a ‘two-way’ flow between camps and local communities is created where the local market benefits from goods and services enabled within the camp, and vice versa (Jahre et al., 2018). These ‘dynamic supply chain

configurations' utilise information and material flows to forecast demand (Matopoulos, Kovács, and Hayes, 2014).

Despite the altered supply chain configuration and reduced logistics, CVA still faces a shared challenge with in-kind assistance: 'last mile delivery' (Kovács, Matopoulos, and Hayes, 2010; Piotrowicz, 2018). Ensuring the delivery of cash to the right beneficiaries at the right time requires an understanding of what options beneficiaries have for accessing and spending the money, which possibility they prefer, and which additional actors are needed to help implement and monitor the programme (Wilson et al., 2018). Hence, the selection of the appropriate delivery mechanism is important. Table 5 provides a summary of the delivery mechanisms discussed in the literature,

Table 5. Types of delivery mechanisms discussed in the sample of literature

Delivery mechanisms	Linkage to context-specific factors and capabilities	Considerations from an HSCM perspective	Outcomes	Citations	Frequency
Direct cash	Internal → Demand → Beneficiary safety, choice, and preference Capability → Flexibility to deliver physical cash	• Beneficiary safety and security	• Reduced operational costs (such as human resource)	13, 15, 18, 19, 20, 22, 23, 26, 27, 30, 36, 37, 39, 42	14
	Internal → Supply → Market availability and accessibility Capability → Logistical capabilities for market assessment	• Market mapping exercises • Supply chain monitoring for commodities	• Increased cost of transportation to reach beneficiaries • Reduced speed of operations		
	External → Economic issues Capability → Logistical capabilities for market assessment, forecasting, and monitoring	• Exchange rate monitoring and forecasting of necessary goods prices • Planning for inflation	• Time-consuming monitoring processes		
	External → Infrastructure Internal → Demand → Beneficiary safety, choice, and preference Capability → Logistical capabilities; access to resources; managing the cash distribution network, and the monitoring/reporting system	• Physical distribution of cash; replacing material flows with financial flows • Strategic distribution of cash in remote areas			
	Internal → Supply → Supplier and donor interest; supplier/vendor selection and contracting; Supplier's expertise Capability → Trust and supplier relations	• Alignment of supply chain strategies between HAs and suppliers/donors so that goods are available when cash is distributed			

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Delivery mechanisms	Linkage to context-specific factors and capabilities	Considerations from an HSCM perspective	Outcomes	Citations	Frequency
	<p>External → Political and security issues</p> <p>Capability → Access to resources, such as security and local knowledge</p>	<ul style="list-style-type: none"> • The risk of terrorism financing and money laundering 			
Mobile money	<p>External → Infrastructure</p> <p>Capability → Flexibility; managing the cash distribution network; access to resources, such as technology</p>	<ul style="list-style-type: none"> • Distribution of telephones/SIM (subscriber identity module) cards • Technical specifications defined for tendering 	<ul style="list-style-type: none"> • Reduced operational (human resource) and logistical (cash distribution) costs 	6, 11, 14, 17, 18, 24, 30, 32	8
	<p>Internal → Supply → Supplier and donor interest; supplier expertise; supplier selection and contracting</p> <p>Capability → Trust and supplier relations</p>	<ul style="list-style-type: none"> • Standardisation of technology • Support services for technology • Partnering with mobile service providers • Data storage and protection across networks 	<ul style="list-style-type: none"> • Increased speed of operation • Increased accuracy of operation • Reduced payment and overall operational costs 		
	<p>External → Infrastructure (such as telecommunications infrastructure)</p> <p>Capability → Flexibility; access to resources</p>	<ul style="list-style-type: none"> • Network coverage for geographic areas • Infrastructure must be able to support the technology 			
Bank account/debit card	<p>Internal → Demand → Beneficiary safety, choice, and preference</p> <p>External → Infrastructure (such as ATMs)</p> <p>Capability → Managing/ designing distribution network; flexibility; access to resources</p> <p>Internal → Supply → Supplier and donor interest; supplier expertise; supplier/vendor selection and contracting</p> <p>Capability → Trust and supplier relations</p>	<ul style="list-style-type: none"> • Set up beneficiary with a bank account • Distribution of debit cards to beneficiaries • ATM access • Liquidity: cash available at each point • Timing of transfers and fixed versus percentage-based fees • Cooperation with FSPs/PSPs • Tendering requirements and vendor selection • External partnerships for implementation and distribution of cards 	<ul style="list-style-type: none"> • Increased cost of transportation to ATM • Reduced operational cost of expanding the programme • Simplified scaling up of the programme 	1, 10, 12, 18, 30, 32, 39	7

Cash and voucher assistance along humanitarian supply chains

Delivery mechanisms	Linkage to context-specific factors and capabilities	Considerations from an HSCM perspective	Outcomes	Citations	Frequency
Paper vouchers	External → Infrastructure Internal → Supply → Market availability and accessibility Capability → Logistical capabilities; managing and monitoring the voucher distribution network	<ul style="list-style-type: none"> • Set up a market where vouchers are accepted • Vendor contracting and monitoring 	<ul style="list-style-type: none"> • Increased human resource costs • Reduced costs of material used, service provided, and logistics • Reduced total operational cost of expanding the programme 	18, 26, 30, 31, 33, 34, 40	7
	External → Political and security issues Capability → Managing the monitoring and reporting system; access to resources, such as technology	<ul style="list-style-type: none"> • Anti-fraud monitoring • Dependent on commodity supply chain 			
	Internal → Supply → Market availability and accessibility; supplier/vendor selection and contacting Capability → Trust and supplier relations	<ul style="list-style-type: none"> • Contracting of printing vouchers • Vendor management and appraisal 			
Electronic vouchers and pre-paid cards	Internal → Supply → Supplier expertise; supplier and vendor selection and contracting Capability → Access to resources; trust and supplier relations; managing/designing the voucher distribution network	<ul style="list-style-type: none"> • Production and procurement of smart cards • Selecting vendors for voucher programmes • Distribution of smart and pre-paid cards to beneficiaries 	<ul style="list-style-type: none"> • Reduced logistical costs per transfer • Increased sensitisation costs (such as costs of training and public awareness) • Increased costs of redemption and travel for beneficiaries • Improved accuracy of operations • Increased response speed and agility 	1, 6, 16, 18, 32, 34	6
	External → Infrastructure Capability → Flexibility; managing the cash distribution network; access to resources External → Infrastructure Internal capability → Access to resources, such as technology, data, and security	<ul style="list-style-type: none"> • Ability of vendors to accept electronic vouchers • Requires POS (point of sale) terminals for acceptance • Reconciliation of financial transactions • Investment in technology and high initial costs 			

Source: authors.

which are further connected to context-specific factors (see Table 3), capabilities (see Table 4), and outcomes for each delivery mechanism.

In the sample of literature, the most frequently discussed mechanism was ‘direct cash’, which was most often used in the ‘recovery’ disaster phase. Direct cash refers to the distribution of physical money to beneficiaries and may be the most straightforward approach to delivering cash-based assistance. The supply chain design of direct cash and vouchers is similar to that of in-kind assistance, but the material flows are replaced by financial flows (Heaslip, Kovács, and Haavisto, 2018b). Both direct cash and vouchers share the advantage of selecting the distribution points to mitigate safety and security risks (Mattinen and Ogden, 2006; Willibald, 2006), but they also shift the burden of transportation to the beneficiary (Tappis and Doocy, 2018). However, physical distribution of cash can be problematic, especially in conflict zones and remote places (Doocy et al., 2016). Paper vouchers also face this burden and must employ additional anti-fraud mechanisms through controlled printing and reconciliation services (Maxwell, 2007).

The use of bank accounts and ATM/debit cards reduces some of the distribution activities associated with physical cash and paper vouchers, but this is possible only when the banking infrastructure is reliable and accessible in the area of implementation (Piotrowicz, 2018). As with direct cash and paper vouchers, most programmes that use ATM/debit cards rely on fixed geographic locations as points of distribution, not always accessible by the beneficiaries. This leads to the need for strategic procurement of financial services and aligning policies among organisations to ensure that all beneficiaries are covered (Martin-Simpson, Parkinson, and Katsou, 2018).

Advances in technology result in innovations such as biometrics, smart cards, mobile telephones, and blockchain (Heaslip, Kovács, and Grant, 2018; Howe and Stites, 2019). Mobile money is one of the fastest-growing delivery mechanisms as it can be used in areas with mobile network coverage, assuming beneficiaries have a telephone. Transactions can be completed instantaneously, and the distribution of cash can occur in large batches, reducing the ‘cash to cash’ cycle (Sodhi and Tang, 2014). Blockchain technology can further automatise processes and reduce the burden of tracking and tracing since the technology uses decentralised ledgers to record all transactions (Wang, Han, and Beynon-Davies, 2019). While technology may ease the distribution process, it can also be a hindrance to beneficiaries if they cannot operate or access platforms as intended, leaving them vulnerable to exclusion. Margolies and Hoddinott (2015) describe how a CVA programme using mobile money relied on beneficiary knowledge of mobile banking services and continuous network coverage. Such conditions help to determine the degree of success of CVA programmes, which is why the delivery mechanism should suit the setting, not the other way around. Several technology-based tools and algorithms were also reported in the literature that may support the decision-making process, such as supply chain modelling (Sodhi and Tang, 2014), algorithms to compare voucher and cash packages (Khoury, 2019; Sahinyazan, Rancourt, and Verter, 2021), and mathematical modelling to evaluate the impacts of the response (Puri et al., 2017).

The strategic sourcing of FSP/PSPs can improve processes through contextual knowledge provided by local actors. As HAs have no direct influence on external factors, there is a need to adjust operations to fit the setting, which affects decisions made in the internal environment. Strategic sourcing further develops capabilities and instils trust among supply chain actors (Doocy et al., 2016). This is especially important in conflict zones, as partnerships with local FSP/PSPs and NGOs can allow for safe ‘last mile delivery’ of cash to remote areas (Howe and Stites, 2019).

Outcomes

Pettigrew (2012) states that, while different contextual factors and process variations influence outcomes, there must be at least one variable against which to measure. The sample of literature frequently referenced measures such as costs, speed, and accuracy of CVA programmes, which are also common indicators in HSCM. Therefore, ‘outcomes’ are categorised according to two performance measures shared by both CVA and HSCM: cost-efficiency (that is, costs versus outputs); and responsiveness (that is, speed and accuracy).

Cost-efficiency

Cost-efficiency focuses on the administrative costs of programmes in relation to the amounts delivered to beneficiaries (Tappis and Doocy, 2018). The subject was frequently discussed throughout the sample of literature in terms of operational (34.2 per cent) and logistics (31.6 per cent) costs. Notably, the reduction in logistical processes is an advantage in a wide range of humanitarian situations, particularly emergency responses (Doocy et al., 2011; Heaslip, Kovács, and Haavisto, 2018b). This finding was common across studies of different contexts. For instance, Lewin et al. (2018) refer to the UN World Food Programme (WFP)’s pilot project in Ethiopia, reporting that CVA cut supply chain costs by up to 25–30 per cent. In a case study of the Ukrainian conflict in 2013–14, Piotrowicz (2018) determined that cash assistance reduced logistics costs by eliminating transportation and warehousing services. Likewise, WFP’s ‘Building Blocks’ project in Jordan and Lebanon demonstrated how HAs can significantly decrease transfer costs using blockchain technology (Wang, Han, and Beynon-Davies, 2019). Lastly, Jahre et al. (2018) describe how CVA lessened the costs of human resources and distribution in Ethiopia, Greece, Kenya, and Turkey.

Margolies and Hoddinott (2015) define modality-specific costs as the combination of logistics, material, and human resource costs. They point out that preparations for travel by humanitarian staff, the execution of payments, and post-monitoring distribution varied across modalities. For instance, vouchers are the lowest cost in terms of materials used, services provided, transportation, and other non-staff costs, but they have a larger human resource requirement as compared to cash. Switching from in-kind assistance to CVA resulted in lower operational costs in the case of the Democratic Republic of the Congo, but beneficiaries cover transportation costs to access ATMs (Tappis and Doocy, 2018).

Although CVA has been shown to improve cost-efficiency, Tappis and Doocy (2018) noted a discrepancy in the inclusion of various costs and how they are measured across CVA studies. This lack of standardisation of measuring implementation and total operational costs makes case comparison difficult. Moreover, cost calculations typically do not consider the possible diversion of funds, such as to armed groups, which may affect the total cost (Howe and Stites, 2019).

Responsiveness

In this study, responsiveness is defined by the speed (that is, timeliness) and accuracy of operations of HAs to deliver CVA. Modality type and delivery mechanism both influence responsiveness considerably. Mobile telephones in particular were said to reduce lead times and increase supply chain visibility (Sodhi and Tang, 2014; Doocy et al., 2016; Tappis and Doocy, 2018). Together with technological advancements in processing, such as blockchain technology (Wang, Han, and Beynon-Davies, 2019) and ERP (enterprise resource planning) systems (Falagara Sigala, Kettinger, and Wakolbinger, 2020), CVA processes may be further expedited by digitisation. Adopting a 'hybrid' model composed of multiple modalities can lead to a more agile response in a time emergency through the integration of local market actors (Maxwell, 2007; Wang, Han, and Beynon-Davies, 2019), while also decoupling the delivery from bureaucratic payment systems (Matopoulos, Kovács, and Hayes, 2014).

Of the articles that discussed the accuracy outcomes of CVA operations, several commented on CVA programmes and improvement in the meeting of beneficiary needs (Kovács, Matopoulos, and Hayes, 2010; Piotrowicz, 2018). Heaslip, Kovács, and Grant (2018) assert that CVA facilitates access to information about beneficiaries' purchasing records, which can help HAs to estimate future needs more accurately. This may also help to stabilise supply chains through a better understanding of beneficiary needs in relation to market supply (Matopoulos, Kovács, and Hayes, 2014). Wilson et al. (2018) affirmed this point and included CVA on a shortlist of 'emergency supply best practices' as it has a major impact on the accuracy of order fulfilment among targeted groups.

Identified gaps in the literature

Despite the advancement of CVA programmes over the past two decades and the burgeoning linkage to HSCM, several gaps remain in the published literature, providing opportunities for further study. First, referring to the findings shown in Figure 3, the scope of literature remains unbalanced along the continuum of the humanitarian operations management cycle, despite the calls for 'cash readiness' ahead of emergencies (see, for example, Barder et al., 2015). Scant research explores the roles of the network of actors in CVA preparedness and mitigation. Donors play a crucial part in the decision-making process, but despite the criticality of their character along supply chains, few articles discuss their explicit involvement in CVA planning and implementation. For instance, Heaslip, Kovács, and Haavisto (2018a)

only posit that CVA is in the interest of donors by according them flexible service opportunities to meet the changing needs of beneficiaries. Maxwell (2007) also states that donors should allocate their resources flexibly and predictably to have a maximal impact, adjusting modalities and delivery mechanisms to provide appropriate responses.

Second, in spite of being connected through the humanitarian supply chain, donor and beneficiary interests are not always aligned. While several studies mention that responses should be beneficiary-driven (see, for example, Maxwell, 2007), there is little to no information in the sample of literature on how this can be achieved during the preparedness and mitigation phases. Most papers address beneficiary needs and preferences as key feasibility criteria for CVA appropriateness (see, for example, Ryckembusch et al., 2013; Heaslip, Kovács, and Haavisto, 2018b; Lewin et al., 2018; Martin-Simpson, Parkinson, and Katsou, 2018). Yet, little is said about beneficiary equity (for instance, in terms of gender, race, or age groups) and CVA delivery mechanism selection in the literature, although it is suggested as a potential indicator to measure impact (Martin-Simpson, Parkinson, and Katsou, 2018). Indicators also do not typically include beneficiary safety and security metrics, regardless of their importance. This should all be considered during the preparedness and mitigation phases.

Third, few articles discuss the decision-making process vis-à-vis delivery mechanism selection. While contextual factors are specified in the case studies (such as the lack of banking infrastructure in Syria since 2011), most do not explain why a particular delivery mechanism was used in a specific context. Furthermore, there was no standard way of measuring modalities against one another; one of the recurrent practices was to compare relative cost-efficiency and responsiveness in particular settings.

Fourth, there is a dearth of evidence on how to coordinate actors involved in CVA programmes, particularly regarding cash preparedness. A lack of standards, despite humanitarian initiatives to implement them, limits the ability to compare studies across different locations. Information related to coordination and communication between various actors along the supply chain, including FPSs, traders, *hawala* brokers, local suppliers, beneficiaries, volunteers, and governments, could reveal how coordination affects internal capacities and capabilities.

Fifth, the sample of literature does not adequately address the hidden logistical costs associated with procurement and contracting of FSP/PSPs, especially in conflict zones where services may be restricted. Activities such as market assessments, tendering, contracting framework agreements, and negotiating with local traders on voucher programmes may incur additional costs. These costs, such as banking and transaction fees, mobile network prices, and other operational charges, need to be studied especially as they relate to the cost-efficiency of a programme.

Lastly, while climate change and environmental issues have been analysed for several years in HSCM literature, they have yet to be fully explored in relation to CVA programmes. CVA has the potential to reduce carbon dioxide emissions by cutting logistical activities (such as warehousing and transportation of goods), but further investigation is needed to understand the overall impact that CVA has on climate change, particularly from an HSCM perspective.

Discussion on the findings

From the synthesis of the descriptive and thematic analyses, several insightful findings and trends emerge relating to the four research questions. The increase in recent publications indicates that research linking HSCM and CVA is growing and recognising the critical role of logistics in the planning, procurement, implementation, and distribution of CVA programmes. However, there appears to be an imbalance in terms of studies across disaster management phases (with less attention paid to the preparedness and mitigation phases) and geographic locations (with a lack of research conducted in Latin America and the Caribbean and Oceania, even though they are increasingly vulnerable to disasters triggered by natural hazards).

Despite the identification of context-specific factors, the SLR revealed many cases in which the reason to use a selected delivery mechanism within a certain context was not indicated. The research posits that HAs should consider both internal and external factors to meet beneficiary needs, as well as guaranteeing their safety and respecting their preferences when possible. Thus, addressing RQ1, HAs must understand which actors constitute their own supply chains, as suppliers, donors, beneficiaries, FSP/PSPs, governments, and local communities all have some degree of influence on the implementation and operation of CVA programmes. In turn, HAs should align their supply chain strategies with the network of actors to ensure cost-efficiency and responsiveness. Beneficiaries should remain in the spotlight when selecting how best to deliver assistance rather than been seen as passive recipients. There is a need for more flexible inter-modal choices, but this flexibility is dependent on the donors, which must also adapt to changing methodologies.

In exploring RQ2, the results affirm the notion that the appropriateness of CVA is highly reliant on context-specific factors, but extends the evidence base to link supply chain dynamics to CVA feasibility and operability. External factors include the type and phase of the disaster, political and security aspects, infrastructure, and local economy criteria. Factors internal to supply chains need to be taken into account, including the availability of goods in local markets, market accessibility, donors' interest, suppliers' interest and expertise, and the contracting framework with respect to FSPs. Monitoring of markets, prices, and exchange rates is a step that can be taken to reduce the impacts of market disruptions. The controlled timing of cash distributions can also affect the value of the transfer and may be used to maximise cost-efficiency. Supplier selection and strategic FSP/PSP partnerships can often facilitate transfers and smooth monitoring and evaluation processes. This infers that external contexts may be influenced to a degree by decisions based on internal factors. In essence, practitioners should leverage their supply network in each context to improve the feasibility and usability of CVA. Regardless, a comprehensive needs assessment is required to target the needs, preferences, choices, and safety of beneficiaries before CVA implementation.

In addressing RQ3 and RQ4, the assessment of CVA delivery processes revealed internal capabilities, the supply chain perspective, and related outcomes for each

delivery mechanism. Utilising capabilities was found to be a countermeasure to uncontrollable external factors. Although CVA programmes reduce logistics activities, logistics capabilities are required for a rigorous market assessment, cash distribution, and the tendering of retailers and FSPs. Increasing the capacity could enhance logistics capabilities, foster trust with other actors in the supply network, and provide more resources to meet programme outcomes in a cost-efficient and timely manner. The selected modality and delivery mechanism have a bearing on the cost, speed, and accuracy of delivery; however, the contextual factors should drive the decision to employ specific delivery mechanisms. HAs need to be flexible and have access to critical resources such as local data, knowledge, security, and technology. Access to resources and technology has proven to be beneficial, especially in reducing the load of financial activities needed for payments, reconciliation, and reporting. Even with technology, 'last mile delivery' can be problematic, and, in some instances, the burden is passed to the beneficiary, who must travel to receive assistance. The results show that each delivery mechanism has its own supply chain factors to consider prior to implementation. Irrespective of the methods chosen, services must be accessible by beneficiaries, especially the most vulnerable groups, even if this entails a trade-off between cost-efficiency and responsiveness.

Recommendations for future research

Drawing on both the findings and the identified gaps in the literature, we can make several recommendations for future studies. First, more emphasis should be put on the preparedness and mitigation phases when conducting research related to CVA programmes. Second, the use of the CCP framework demonstrates how mechanisms support the intervention and drive outcomes, but it remains unclear how each delivery mechanism is influenced by the context. Hence, it is recommended that the evidence base for CVA continues to be developed across settings.

The idea that CVA programmes eliminate logistics activities, such as transportation, delivery, and warehousing, is erroneous. Although the logistics activities of HAs are reduced and responsibilities are shared with other actors in the network, local producers, suppliers, and retailers must still deliver goods to market. The delivery is 'outsourced' by HAs to local companies. This raises research questions regarding how local vendors cope during and after a disaster, what capabilities they need to perform their logistical tasks, what is required to increase their preparedness to respond better to disasters, and how coordination of CVA impacts on their operations.

Contributions of the research

By linking critical information from multiple studies across two emerging areas, HSCM and CVA programmes, this SLR has yielded additional insights, which have theoretical and practical implications for the development and usage of CVA, in addition to providing avenues for future research. The primary contribution of this SLR

is the in-depth analysis of CVA programmes from different perspectives and in different locations. The use of the CCP framework revealed the underlying contextual factors required for CVA programmes by connecting internal factors (supply and demand) and external environmental factors, identifying key actors involved along the supply chain, and highlighting the capabilities needed for the delivery process. Through this categorisation, the study demonstrates how outcomes are influenced by process modules (that is, delivery mechanisms), which are determined by the context and supply chain actors. This approach contributes to the expanding pool of knowledge of CVA programmes by identifying elements that are generalisable and other particularities that relate only to specific locales.

Furthermore, the findings obtained from the SLR can help policymakers and humanitarian practitioners with the planning, design, and implementation of CVA programmes in humanitarian contexts. The analysis of contextual factors as feasibility criteria (such as political pressure, security, local economy, and infrastructure) paints a clearer picture of the needs and risks to be assessed prior to CVA delivery.

The findings offer further evidence that practitioners must consider and prioritise the needs and preferences of the beneficiaries at the centre. Beneficiaries need to be included in the decision-making process for CVA delivery. Donor and supplier interests and expertise in CVA implementation need to be considered as well.

Lastly, the research contributes to the processes and the outcomes of CVA programmes by using a supply chain lens. With regard to the delivery mechanism, the study provides important information on the logistics capabilities required for CVA delivery, as well as on trust-building, flexibility, access to scarce resources, and managing the cash distribution and monitoring network.

Limitations of the research

While the discussed insights have been drawn from the data analysis through the SLR process, it is important to acknowledge the limitations of this study. First, given the HSCM perspective adopted by this study, only two dimensions of outcomes are emphasised (cost-efficiency and responsiveness) for the delivery of CVA programmes. Not all of the outcome-related issues are covered by this evaluation, therefore. While this was a component of the research design, further work is recommended, encompassing additional dimensions of outcomes that also influence CVA programmes, such as market impacts, accountability to donors, beneficiary's satisfaction, and coordination costs.

In addition, as secondary data were employed, a possible limitation of the study relates to the general validity and reliability of qualitative literature research. More studies in humanitarian settings will help to advance theory and provide more empirically grounded evidence connecting the success of CVA programmes to HSCM strategies. The success of CVA programmes is largely dependent on realising SCM as a core competence alongside finance, security, and information technology to form a balanced approach to research and practice.

Lastly, this study was conducted using only academic papers from peer-reviewed journals. While this was part of the research design, it does not discredit the importance of non-peer reviewed sources and grey literature. The authors recognise that several key works have helped to build the theory of CVA through the inclusion of non-peer reviewed literature: Barder et al. (2015); Bastagli et al. (2016); and Davis et al. (2016). Consequently, this paper should be viewed as complementary to the available literature, noting the distinction that it focuses on logistics insights from an HSCM perspective.

Conclusion

This study indicates the interlinkage between CVA and HSCM as well as the influence that operability and functionality have on each of them. The CCP framework allowed for analysis of CVA processes in varying humanitarian operations, revealing general aspects of CVA programmes across contexts as well as specific factors related to different settings. While CVA as a modality has the potential to reduce operational and logistical costs, results vary depending on the delivery mechanisms and external factors in the area of the operation. Supply chain actors and their capabilities influence the planning, implementation, and delivery of CVA processes, affecting overall outcomes. As interventions strive to become more beneficiary-driven, a blending of delivery mechanisms and modalities may lead to responding to needs with greater cost-efficiency and responsiveness. This requires strengthening relationships along the supply chain and incorporating beneficiaries into the decision-making process. CVA can thus effectively realign humanitarian supply chains to create more agile responses and meet beneficiary needs more accurately based on both their prioritised requirements and personal preferences.

Appendix

Table A1. The reference list of included studies

No.	Author(s)	Year	Journal	Research method	Main organisation(s) involved	Cause of disaster	Disaster management phase	Country/region
1	J.G. Castillo	2021	<i>Journal of Humanitarian Logistics and Supply Chain Management</i>	Modelling	Danish Refugee Council (DRC)	Natural hazard	Response and preparedness	Colombia
2	B. Vogel, K. Tschunkert, and I. Schläpfer	2022	<i>Disasters</i>	Case study	World Food Programme (WFP) and local market operators	Anthropogenic	Response, recovery, and mitigation	Lebanon

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No.	Author(s)	Year	Journal	Research method	Main organisation(s) involved	Cause of disaster	Disaster management phase	Country/region
3	E.X. Wood and T. Frazier	2020	<i>Journal of Humanitarian Logistics and Supply Chain Management</i>	Archival/secondary data	Not applicable (N/A)	Complex emergency	Response, recovery, and preparedness	Global
4	I. Falagara Sigala, W.J. Kettinger, and T. Wakolbinger	2020	<i>Journal of Humanitarian Logistics and Supply Chain Management</i>	Case study	Médecins Sans Frontières (MSF)	Complex emergency	Response	Global
5	F.G. Sahinyazan, M-E. Rancourt, and V. Verter	2021	<i>Production and Operations Management</i>	Modelling	WFP	Natural hazard	Response	Kenya
6	Y. Wang, J.H. Han, and P. Beynon-Davies	2019	<i>Supply Chain Management: An International Journal</i>	Archival/secondary data	WFP	Anthropogenic	Recovery	Kenya, Syria
7	M. Brennan, P. Sundar, J. Goentzel, D. Frey, and J. Mathias	2019	<i>Food Policy</i>	Experiment	United States Agency for International Development (USAID) and the United States Department of Agriculture	Complex emergency	Response and recovery	United States
8	B.J. Khoury	2019	<i>Journal of Humanitarian Logistics and Supply Chain Management</i>	Modelling	Local NGOs, WFP, European Civil Protection and Humanitarian Aid Operations (ECHO)	Complex emergency	Response	Syria
9	K. Howe and E. Stites	2019	<i>Disasters</i>	Case study	Local NGOs, international NGOs, UN agencies	Anthropogenic	Response and recovery	Syria, Turkey
10	S. Rao, R. Nilakantan, D. Iyengar, and K.B. Lee	2019	<i>Journal of Business Logistics</i>	Archival/secondary data	Commercial banks and organisations	Complex emergency	Recovery	India
11	G. Heaslip, G. Kovács, and I. Haavisto	2018	<i>Journal of Humanitarian Logistics and Supply Chain Management</i>	Interview	World Bank, European Union, Palestine Ministry of Social Affairs, UN agencies, international NGOs, commercial organisations	Anthropogenic	Response and preparedness	Palestine

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No.	Author(s)	Year	Journal	Research method	Main organisation(s) involved	Cause of disaster	Disaster management phase	Country/region
12	R. Lewin, M. Besiou, J.B. Lamarche, S. Cahill, and S. Guerrero-Garcia	2018	<i>Journal of Humanitarian Logistics and Supply Chain Management</i>	Interview	WFP, local private sector, civil society organisations	Natural hazard	Response, recovery, and preparedness	Philippines
13	W.D. Piotrowicz	2018	<i>Journal of Humanitarian Logistics and Supply Chain Management</i>	Case study	Caritas Poland, Polish Humanitarian Action, Polish Center for International Aid	Complex emergency	Response and recovery	Ukraine
14	G. Heaslip, G. Kovács, and D.B. Grant	2018	<i>Journal of Humanitarian Logistics and Supply Chain Management</i>	Archival/secondary data	International humanitarian organisations	Complex emergency	Response, recovery, and mitigation	Global
15	M.M. Wilson, P. Tatham, J. Payne, C. L'Hermitte, and M. Shapland	2018	<i>Journal of Humanitarian Logistics and Supply Chain Management</i>	Interview	New South Wales Rural Fire Service, NSW State Emergency Service, local NGOs, government	Natural hazard	Response	Australia
16	M. Jahre, J. Kembro, A. Adjahossou, and N. Altay	2018	<i>Journal of Humanitarian Logistics and Supply Chain Management</i>	Case study	United Nations Refugee Agency (UNHCR)	Anthropogenic	Recovery	Ethiopia, Greece, Kenya, Turkey
17	M.A. Shareef et al.	2018	<i>Annals of Operations Research</i>	Survey	Local NGOs, government, donor agencies	Natural hazard	Response, recovery, and mitigation	Bangladesh
18	H. Tappis and S. Doocy	2018	<i>Journal of Development Effectiveness</i>	Archival/secondary data	N/A	Anthropogenic	Response and recovery	Global
19	G. Heaslip, G. Kovács, and I. Haavisto	2018	<i>Production Planning & Control</i>	Interview	UN agencies, international NGOs, commercial organisations	Anthropogenic	Recovery	Palestine
20	J.M. Cunha, G. De Giorgi, and S. Jayachandran	2018	<i>The Review of Economic Studies</i>	Case study	Government	Complex emergency	Recovery	Mexico
21	S. Martin-Simpson, J. Parkinson, and E. Katsou	2018	<i>Journal of environmental management</i>	Archival/secondary data	WFP, Oxfam	Natural hazard	Response, recovery, and preparedness	Global

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No.	Author(s)	Year	Journal	Research method	Main organisation(s) involved	Cause of disaster	Disaster management phase	Country/region
22	F. Burchi, M. Scarlato, and G. d'Agostino	2018	<i>Poverty and Public Policy</i>	Case study	Government, World Bank	Natural hazard	Recovery and mitigation	Sub-Saharan Africa
23	A. Enshassi, T. Chatat, J. von Meding, and G. Forino	2017	<i>International Journal of Disaster Risk Science</i>	Survey	Government, local and international NGOs, donor agencies	Anthropogenic	Recovery and mitigation	Gaza Strip
24	J. Puri, A. Aladysheva, V. Iversen, Y. Ghorpade, and T. Brück	2017	<i>Journal of Development Effectiveness</i>	Modelling	Government, NGOs, UN agencies, commercial organisations	Complex emergency	Response and recovery	Global
25	C. Burkart, M. Besiou, and T. Wakolbinger	2016	<i>Surveys in Operations Research and Management Science</i>	Modelling	HAs, donors	Complex emergency	Response and recovery	Global
26	S. Doocy, H. Tappis, and E. Lyles	2016	<i>Journal of International Humanitarian Action</i>	Case study	Donors, local and international NGOs, local councils, community members, commercial money traders	Anthropogenic	Response	Syria
27	A. Nikulkov, C.B. Barrett, A.G. Mude, and L.M. Wein	2016	<i>PloS One</i>	Modelling	USAID	Natural hazard	Response	Kenya
28	K. Özpolat, J. Rilling, N. Altay, and E. Chavez	2015	<i>Journal of Humanitarian Logistics and Supply Chain Management</i>	Case study	USAID	Natural hazard	Response	Global
29	M.A. Ülkü, K.M. Bell, and S.G. Wilson	2015	<i>Annals of Operations Research</i>	Modelling	Not-for-profits and coordinated help organisations	Complex emergency	Response	United States
30	A. Margolies and J. Hoddinott	2015	<i>Journal of Development Effectiveness</i>	Case study	WFP	Anthropogenic	Recovery	Ecuador, Niger, Uganda, Yemen
31	M. Besiou and L.N. Van Wassenhove	2015	<i>Production and Operations Management</i>	Archival/secondary data	WFP	Complex emergency	Recovery	Global

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No.	Author(s)	Year	Journal	Research method	Main organisation(s) involved	Cause of disaster	Disaster management phase	Country/region
32	M.S. Sodhi and C.S. Tang	2014	<i>Production and Operations Management</i>	Modelling	Government, NGOs, humanitarian organisations	Natural hazard	Response, recovery, mitigation, and preparedness	Asia
33	A. Matopoulos, G. Kovács, and O. Hayes	2014	<i>Decision Sciences</i>	Case study	NGOs, suppliers, contractors, housing reconstruction committee, European Agency for Reconstruction	Anthropogenic	Recovery	Kosovo
34	D. Ryckembusch et al.	2013	<i>World Development</i>	Experiment	WFP	Complex emergency	Preparedness	Global
35	D. Maxwell and J. Parker	2012	<i>Food Security</i>	Case study	Food and Agriculture Organization of the United Nations, WFP	Natural hazard	Response, recovery, and mitigation	Côte d'Ivoire, Haiti, Pakistan
36	S. Doocy et al.	2011	<i>Social Science & Medicine</i>	Survey	UNHCR	Anthropogenic	Response, recovery, and mitigation	Iraq, Jordan, Syria
37	R. Sabates-Wheeler and S. Devereux	2010	<i>Food Policy</i>	Survey	Government	Natural hazard	Response, recovery, and mitigation	Ethiopia
38	G. Kovács, A. Matopoulos, and O. Hayes	2010	<i>International Journal of Logistics: Research and Applications</i>	Case study	Local NGOs, private traders, suppliers, European Agency for Reconstruction	Anthropogenic	Recovery	Kosovo
39	D. Kelaher and B. Dollery	2008	<i>International Review of Public Administration</i>	Case study	WFP	Natural hazard	Response and recovery	Indonesia
40	D. Maxwell	2007	<i>Disasters</i>	Case study	WFP	Anthropogenic	Response, recovery, mitigation, and preparedness	Sudan
41	B. Sharp	2007	<i>Disasters</i>	Case study	WFP	Anthropogenic	Recovery and mitigation	Sudan
42	H. Mattinen and K. Ogden	2006	<i>Disasters</i>	Case study	Action contre la Faim	Anthropogenic	Recovery	Southern Somalia
43	S. Willibald	2006	<i>Disasters</i>	Case study	UN agencies, World Bank	Anthropogenic	Response and recovery	Sierra Leone
44	S. Doocy, M. Gabriel, S. Collins, C. Robinson, and P. Stevenson	2006	<i>Disasters</i>	Case study	Mercy Corps	Natural hazard	Recovery	Indonesia

Source: authors.

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Data availability statement

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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Endnotes

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APPENDIX 2

Article #2

Harpring, R., Maghsoudi, A., Fikar, C., Piotrowicz, W. D., & Heaslip, G. (2021). An analysis of compounding factors of epidemics in complex emergencies: a system dynamics approach. *Journal of Humanitarian Logistics and Supply Chain Management*, 11(2), 198–226. <https://doi.org/10.1108/JHLSCM-07-2020-0063>

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An analysis of compounding factors of epidemics in complex emergencies: a system dynamics approach

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Abstract

Purpose – This study aims to describe the compounding factors in a complex emergency, which exacerbate a cholera epidemic among vulnerable populations due to supply chain disruptions. Basic needs such as food, medicine, water, sanitation and hygiene commodities are critical to reduce the incidence rate of cholera and control the spread of infection. Conflicts cause damage to infrastructure, displace vulnerable populations and restrict the flow of goods from both commercial and humanitarian organizations. This study assesses the underlying internal and external factors that either aggravate or mitigate the risk of a cholera outbreak in such settings, using Yemen as a case study.

Design/methodology/approach – This study adopts a system dynamics methodology to analyze factors that influence cholera outbreaks in the context of the Yemeni Civil War. A causal loop diagram with multiple components was constructed to represent the complexities of humanitarian situations that require critical decision-making. The model was built using data from humanitarian organizations, non-governmental organizations and practitioners, along with literature from academic sources. Variables in the model were confirmed through semi-structured interviews with a field expert.

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Findings – Compounding factors that influenced the cholera outbreak in Yemen are visualized in a causal loop diagram, which can improve the understanding of relationships where numerous uncertainties exist. A strong link exists between humanitarian response and the level of infrastructure development in a country. Supply chains are affected by constraints deriving from the Yemeni conflict, further inhibiting the use of infrastructure, which limits access to basic goods and services. Aligning long-term development objectives with short-term humanitarian response efforts can create more flexible modes of assistance to prevent and control future outbreaks.

Research limitations/implications – The model focuses on the qualitative aspects of system dynamics to visualize the logistics and supply chain-related constraints that impact cholera prevention, treatment and control through humanitarian interventions. The resulting causal loop diagram is bounded by the Yemen context; thus, an extension of the model adapted for other contexts is recommended for further study.

Practical implications – This study presents a systematic view of dynamic factors existing in complex emergencies that have cause-and-effect relationships. Several models of cholera outbreaks have been used in previous studies, primarily focusing on the modes and mechanisms of transmission throughout a population. However, such models typically do not include other internal and external factors that influence the population and context at the site of an outbreak. This model incorporates those factors from a logistics perspective to address the distribution of in-kind goods and cash and voucher assistance.

Social implications – This study has been aligned with six of the United Nations Sustainable Development Goals (SDGs), using their associated targets in the model as variables that influence the cholera incidence rate. Recognizing that the SDGs are interlinked, as are the dynamic factors in complex humanitarian emergencies, the authors have chosen to take an interdisciplinary approach to consider social, economic and environmental factors that may be impacted by this research.

Originality/value – This paper provides an insight into the underlying inter-relations of internal and external factors present in the context of a cholera outbreak in a complex crisis. Supply chains for food; water, sanitation and hygiene; and health products are crucial to help prevent, control and treat an outbreak. The model exposes vulnerabilities in the supply chain, which may offer guidance for decision makers to improve resilience, reduce disruptions and decrease the severity of cholera outbreaks.

Keywords Humanitarian logistics, Complex emergency, Cash and voucher assistance, Epidemics, In-kind assistance, System dynamics, Resilience, Cholera outbreak, Disruptions, Casual loop diagram

Paper type Research paper

1. Introduction

Humanitarian organizations plan for, respond to and assist in recovery from disasters, whether man-made, natural or mix of both. Disasters that occur amid, or as a result of, conflict and political instability often require humanitarian interventions and are classified as “complex emergencies” (UNOCHA, 2018). Such disasters often damage infrastructure and logistics capacities, disrupting services and the flow of basic commodities (Puri *et al.*, 2017). Disruptions in one segment of the supply chain can impact all other echelons for a prolonged period (Ivanov *et al.*, 2014). The unpredictability of events in complex emergencies leaves humanitarian supply chains (HSCs) vulnerable to disruptions and may reduce the effectiveness of responses by aid agencies, which rely on external resources and a network of actors, including donors, suppliers, non-governmental organizations (NGOs), service providers and governmental agencies (Kovács and Tatham, 2009). Consequently, vulnerable populations affected by complex emergencies may be exposed to greater risks due to access and availability constraints for attaining basic goods and services.

One of the major risks of mortality in complex emergencies is that of communicable diseases, especially diarrheal diseases that have the capability of spreading rapidly once control mechanisms are restricted or removed (Connolly, 2005). Cholera is one of the major diseases that poses a serious risk to populations in complex emergencies. The primary mode of transmission is through contaminated water sources, meaning that populations that lack of access to safe water and sanitary facilities are most vulnerable. Victims experience a rapid onset of acute watery diarrhea, which may cause severe dehydration or death in a matter of hours (WHO, 2009). Conflict and other events that displace populations contribute to the likelihood of an outbreak, as the movement and temporary settlement of persons increases

the risk of transmission (Chaignat and Monti, 2007). As Kelly-Hope (2008) note, primary risk factors for cholera coincide with the consequences of conflict: poverty, displacement, lack of access to facilities and lack of safe drinking water. In a review of a study on emerging diseases in conflicts (Gayer *et al.*, 2007), cholera outbreaks were reported in nearly every conflict zone from 1990 to 2006 alongside other infectious diseases (Kelley-Hope, 2008).

The Global Task Force on Cholera Control (GTFCC) acknowledges that cholera is a preventable disease, but one in which outbreaks persist and remain prevalent, especially in fragile and conflict-affected areas (GTFCC, 2017). The GTFCC cites the cholera outbreak in Yemen as one of the worst in modern times, with over 2.3 million suspected cases since 2016. The situation has been made worse by the ongoing conflict, failing infrastructure and food insecurity that the country faces. To prevent outbreaks such as this from occurring in the future, the GTFCC has created a roadmap to eliminate the threat of cholera by 2030 and aims to reduce cholera mortality by 90% in the same timeframe. Basic needs such as food; health care; and water, sanitation and hygiene products (WASH) are critical to reduce the incidence rate of cholera and control the spread of infection during an outbreak. The provision of these supplies relies on a coordinated logistical effort from multiple actors. Thus, it is important to understand the underlying structure and relationships in HSCs that provide those goods and services for the protection of populations.

Consequently, decision-making in rapidly changing environments requires a thorough understanding of the problem (Kapucu and Garayev, 2011), with special attention paid to key stakeholders and contextual factors, which may change rapidly (Dinizet *et al.*, 2005). Adopting a systems perspective of the problem context is useful for analyzing interactions of entities within a system and learning how a system behaves (Stermann, 2000). In this manner, mapping interrelationships of key stakeholders along HSCs can reveal logistics barriers and potential improvements through systems analysis (Heaslip *et al.*, 2012). With this in mind, a system dynamics (SD) methodology is suggested in this work. Besiou *et al.* (2011) note that SD models can assist humanitarian decision makers to explore possible courses of action in highly uncertain environments. The focus of this work is set on the qualitative aspects of SD, i.e. causal loop diagrams (CLDs), to visualize the numerous factors that directly and indirectly affect humanitarian responses during a cholera outbreak occurring in a specific context. Using CLDs without quantification does have drawbacks, as behavior is not deduced, but only inferred, making the magnitude of feedback effects difficult to represent (Lane, 2008). However, when used correctly, qualitative models can provide value by depicting complex systems in a manner that can improve understanding of relationships where numerous uncertainties exist (Coyle, 2000). This research uses the strengths of qualitative SD approaches to promote systems thinking and provide visualization of feedback loops for decision makers (Wolstenholme, 1999). Thus, the research objectives (RO) of this paper are as follows:

- RO1. To identify key internal and external factors that either aggravate or mitigate the risk of a cholera outbreak in a complex emergency.
- RO2. To develop a visualization of the causal relationships and dynamic effects of the identified variables from RO1 using the SD methodology.
- RO3. To explore the connection between relevant sustainable development goals and responding to needs to improve preparedness measures toward future epidemics.

This research has been aligned with six of the United Nation's (UN's) Sustainable Development Goals (SDGs), using their associated targets in the model as variables that influence the cholera incidence rate. Recognizing that the SDGs are interlinked, as are the dynamic factors in complex humanitarian emergencies, we have chosen to take an interdisciplinary approach to consider social, economic and environmental factors that may

be impacted by this research. Thus, in aiming to achieve the primary objectives of this work as stated above, the following SDGs may be positively impacted: (SDG 1) no poverty; (SDG 3) good health and well-being; (SDG 4) quality education; (SDG 6) clean water and sanitation; (SDG 9) industry, innovation and infrastructure; and (SDG 11) sustainable cities and communities.

The remainder of this paper is structured as follows. The next section describes the applications of SD methods in both humanitarian operations and epidemic modeling. [Section 3](#) outlines the framework for the model, including an analysis of the context used for the model. [Section 4](#) discusses the key factors and causal relationships from the model, implications for humanitarian decision makers and limitations to the model. Finally, [Section 5](#) provides a conclusion and suggests areas for future research.

2. Preparing for epidemics in complex emergencies

Several definitions exist for “complex emergencies,” including the characteristics that define such situations. Most are derived from the UN Office for the Coordination of Humanitarian Affairs (UNOCHA) definition, which states it as “a humanitarian crisis in a country, region or society where there is total or considerable breakdown of authority resulting from internal or external conflict and which requires an international response that goes beyond the mandate or capacity of any single agency and/or the ongoing United Nations country program” ([IASC, 1994](#)). Other scholars have expanded upon this definition to include additional characteristics and attributes. [Burkle \(1999\)](#) summarized these characteristics and provided a simplified definition as, “the international response to state disruption and its sustaining infrastructure.” Despite the varying definitions, [Macias \(2013\)](#) notes that while definitions may differ, the root causes of complex emergencies do not. In a critical literature review on studies of “complex emergencies,” the following characteristics were present across all complex emergencies: (1) conflict or political instability, (2) environmental effects, (3) poverty or vulnerability of an affected population and (4) social and economic factors.

These characteristics have been found to be drivers of epidemics during complex emergencies, often through a series of cascading factors ([Hammer *et al.*, 2018](#)). For example, armed conflict may force population displacement and limit access to health services, leading to a need for humanitarian assistance and international aid, which may be hindered by disrupted logistics activities, exacerbating the risk of the spread of communicable diseases. The World Health Organization (WHO) recognizes that communicable diseases are a major cause of mortality in complex emergencies ([Connolly, 2005](#)), especially when basic needs are no longer met. Preventing and controlling communicable diseases in such environments require safe water, food, sanitary facilities, shelter, good hygiene practices and health care. The provision of these commodities and services in emergencies, when local supply chain fails, relies on HSCs. Unfortunately, transportation networks are vulnerable in disaster settings, leading to disruptions in the supply of relief items ([Berariu *et al.*, 2015](#)).

Resilience in HSCs can lessen the impact of disruptions by reducing exposure to risks ([Peck, 2006](#)) and having sufficient capacity to recover and return to the original state, or greater ([Jüttner and Maklan, 2011](#)). [Papadopoulos *et al.* \(2017\)](#) argue that supply chain resilience is dependent upon the quality of infrastructure at the time of the disaster. Infrastructure relies upon economic and social development; thus, least-developed countries (LDC) are generally less resilient to disasters and are hindered by structural constraints, making supply disruptions more severe. Decision makers in complex humanitarian emergencies must consider flexible modes of support to continuously meet needs in a dynamic environment ([Piotrowicz, 2018](#)). In this manner, implementing both proactive and reactive response measures can reduce risk of severe disruptions ([Elluru *et al.*, 2017](#)).

In-kind assistance and cash and voucher assistance (CVA) are two complementary modalities that can be used to meet needs across multiple sectors ([Sabates-Wheeler and](#)

Devereux, 2010). Devereux (2006) strongly argues that CVA and in-kind assistance have become unnecessarily polarized. Instead of being pitted against one another, the context and environmental situations should guide response efforts as cash can be delivered in some circumstances, and commodities, using the in-kind modality, in others. CVA provides financial support directly to beneficiaries, giving them a flexible means to cover their needs. For humanitarian organizations, this can reduce the dependence on transportation, warehousing and delivery of goods, ultimately lowering logistics costs and enabling beneficiaries to meet their needs quicker and more accurately (Heaslip *et al.*, 2018). However, there are several prerequisites to CVA implementation, including the presence of functioning markets that are accessible for beneficiaries and offer sufficient quantities of needed goods or services (ECHO, 2013). The provision of CVA as a standalone mode of support may not be enough to mitigate the risk of supply disruptions, but providing it alongside other forms of support gives decision makers the option to respond according to the current circumstances and adjust their strategy accordingly (Piotrowicz, 2018). Market-based programming is a flexible sourcing strategy that is guided by market analyses to determine which mode of response, or combination thereof, would be most efficient and cost-effective in a given context (Martin-Simpson *et al.*, 2018). As this type of approach takes advantage of both the private and humanitarian sector to meet the needs of a population, there is a greater capacity to provide an effective response, potentially lessening the effects of supply disruptions.

Regardless of how a response is formulated, decision makers should be aware of both intended and potentially unintended consequences of a chosen strategy. Unintended consequences are not always obvious, as causal relationships can be distantly linked over time and space (Stermann, 2000). Given the number of dynamic factors in complex emergencies, actions can create ripple effects, leading to direct and indirect outcomes along a chain (Ivanov *et al.*, 2014). For this reason, several studies in humanitarian operations have suggested adopting a systems perspective to approach multi-faceted problems and be better prepared for such potential outcomes. SD has been used in the humanitarian sector before to explore complex causal relationships in food distribution supply chains (Armendariz *et al.*, 2016), performance management in humanitarian organizations (Anjomshoae *et al.*, 2017), humanitarian relief and recovery operations (Gonçalves, 2011) and for the logistics of field vehicle fleet management in the humanitarian context (Besiou *et al.*, 2011).

An SD approach can equip decision makers in humanitarian settings with tools to better predict longitudinal consequences of actions taken in a defined context (Besiou *et al.*, 2011) and can be used as a training tool to improve responses to disasters through simulated scenarios (Berariu *et al.*, 2016). Sterman (2000) notes that the SD methodology is designed for use in non-linear systems of dynamic complexity, where interactions among actors create feedback loops with time-dependent effects. The causal (cause and effect) relationships can be visualized through CLDs, which are important for understanding how actors are connected in a network and how their actions lead to certain effects. Links in the system are one-directional and can be positive or negative, depending on the type of effect the action creates. As more links are established, loops will form, which can be reinforcing or balancing, representing positive or negative feedback, respectively (Stermann, 2000). CLDs that mimic real-world systems help explain behavior in the system and allow visualization of the entire system as a whole and as individual parts with underlying feedback mechanisms, which can be a powerful tool for making decisions against complex settings.

2.1 Systems dynamics in epidemic modeling

Epidemiology studies have utilized SD tools and models to understand how communicable diseases spread throughout a population over time. One of the most used frameworks is the susceptible–infectious–recovered (SIR) model, in which individuals in a system are susceptible to being infected and ultimately recover or are removed from the system (Anderson and May, 1991). SIR models have been used in humanitarian contexts to study the

dynamics of transmission and recovery rates for diseases such as cholera (Mukandavire and Morris, 2015), HIV (Perelson, 2002), Ebola (Rachah and Torres, 2015), influenza (Pruyt and Hamarat, 2010) and COVID-19 (Wu *et al.*, 2020).

In a review of studies that incorporate models that depict cholera outbreaks and interventions, the majority seek to understand the modes of transmission, pathogen movement and effectiveness of interventions (Chao *et al.*, 2014). These models often cite environmental and exogenous factors that influence the velocity of disease spreading and severity of an epidemic. For instance, as a waterborne disease, the spread of cholera is attributed to environmental factors, including flooding and droughts, which may contaminate water supplies or drive populations to drink unsafe water (Codeco, 2001). As the disease has the potential to spread rapidly throughout a population, the WHO states that even a single confirmed case of cholera is sufficient to declare an outbreak and initiate response measures (Connolly, 2005).

Common interventions to counter an outbreak of cholera include the provision of WASH products and oral cholera vaccinations (OCVs) to stop the spread of the disease. Both CVA and in-kind assistance may be used to cover the needs. However, an optimal intervention in one context might not be the most effective in another context. Grad *et al.* (2012) urge caution when quantifying and reporting the effectiveness of cholera interventions, noting that context-specific parameters influence model behavior and output. As such, modeling of interventions should consider demographic, geographic and time-sensitive data when making claims toward effectiveness of an intervention. This is especially important for interventions in complex emergencies, which involve cascades of risk factors with multiple feedback loops (Hammer *et al.*, 2018). Interventions in contexts that are not fully scoped out may result in unintended consequences.

Regardless of the intervention chosen, logistics operations and capacities are required for the provision and delivery of needed commodities. However, logistics is not always able to provide goods in complex emergencies. Numerous gaps in research pertaining to the logistics of responses for controlling epidemics remain, including multidisciplinary and holistic approaches (Dasaklis *et al.*, 2012). Diarrheal diseases remain one of the main causes of morbidity and mortality in emergencies (Connolly, 2005), and delays in the provision of relief can lead to a loss of life. This prompts the necessity of resilient supply chains to provide effective interventions when and where they are needed. To do so, an understanding of the whole system is required. Thus, the motivation of this research is to expand upon existing SD models for cholera outbreaks by including logistics and supply-related challenges of humanitarian organizations operating in complex emergencies. The following section explains the methods for building the CLD and an overview of the Yemeni context.

3. Methodology and model basis

The development of the CLD followed guidelines provided by Sterman (2000) and involved an iterative process of reviewing relevant literature to establish causal links, attributing polarity to each link, identifying balancing and reinforcing loops in the model and revising the boundaries of the model as more information emerged. Relevant literature consisted of publications and reports from UN agencies, governments and NGOs that describe operations to prevent, control and treat outbreaks of cholera in Yemen. In addition, a series of interviews with a senior executive of the GTFCC was conducted for model validity. The interviewee had more than ten years of experience working with UN agencies against outbreaks in complex emergencies and had first-hand experience with cholera control in Yemen during the height of the outbreak in 2017.

3.1 Inductive review of literature

The review of literature began with empirical data related to the spread of cholera in Yemen, then expanded to understand the causal and cascading factors that led to an epidemic.

Investigation began with the mechanics of cholera propagation to identify causal relationships with elements present in the Yemen context. For instance, it is well established that cholera is a waterborne disease, but less is known about how sources of water become contaminated and why Yemenis do not have access to safe water. Therefore, we inductively looked for causal patterns in the literature to capture the Yemen context and compounding factors that influence the spread of cholera.

3.2 Yemen context

According to the UN, the humanitarian crisis in Yemen is the worst in the world (UNOCHA, 2019). The ongoing conflict has been oscillating in intensity since 2014, as the internationally recognized government (IRG) and coalition forces fight for control against the de facto authorities (DFA) in the northeast. The situation has grown into a protracted crisis with more than 24 million people in need of assistance in-country (REACH, 2019). Yemen has long been vulnerable to poverty and instability, ranking only 177th out of 189 countries in the UNDP's 2019 Human Development Index (Conceição, 2019). Furthermore, ACAPS (2019) lists the crisis severity in Yemen as "Very High Severity," a critical designation shared with only five other countries globally. The population in Yemen grew from 7.95 million in 1980 to 29.17 million in 2019 (World Bank, 2020b). Despite increased local food production, Yemen relies heavily on imports, with 90% of food sources arriving from other countries (UNOCHA, 2018).

The Logistics Cluster conducts capacity assessments to evaluate infrastructure (e.g. port/airport, road/rail, storage capacity and local transportation resources) and services (e.g. financial, education, health, insurance and customs) in countries and regions of operation. In the assessment of Yemen, the Logistics Cluster noted the infrastructure lacked development before the start of the conflict and has since sustained extensive damage from both the DFA and IRG (Logistics Cluster, 2010). UNOCHA's Humanitarian Needs Overview (2019) reports that the destruction of public and civilian infrastructures has caused access constraints, limiting the use of roads, stalling seaport activities, and more importantly, collapsing half of the public health facilities.

Against these settings, Yemenis were subjected to one of the largest cholera outbreaks in epidemiologically recorded history, with over 2.3 million reported cases from October 2016 to January 2020 (WHO, 2020). The lack of available and accessible health services, medicines and safe water worsened the situation, as goods needed to be transported through seaports, which were damaged in the conflict. As a result, the importing of basic commodities was reduced, reflecting a lack of confidence from suppliers and shipping companies due to heavy restrictions and poor maritime infrastructure. As the seaports are key supply routes for other commodities besides humanitarian aid, they have been targeted by both factions of the conflict, resulting in supply disruptions to most of the country. For example, in November 2017, a blockade of the port by the IRG and coalition forces resulted in a halt of the flow of supplies into the northwest of the country, spoiling tons of food and medical supplies at sea (Fink, 2017). This further exacerbated the cholera outbreak, as displaced populations resorted to negative coping mechanisms, such as reduced clean water purchases and lower food consumption, which further spread the disease (Federspiel and Ali, 2018; UNOCHA, 2019). Disruptions not only affect beneficiaries, but may distort markets and supply lines, reducing the purchasing power of both market suppliers and beneficiaries. Thus, the inadequate infrastructure amid the ongoing conflict had a compounding effect and hampered efforts to prevent and control the cholera outbreak in 2017.

3.3 Influential external factors in Yemen

In the CLD, external factors represent uncontrollable forces that affect the model's internal variables. These variables have no inputs inside the boundaries of the model, therefore only exert influence through outputs to create second order effects. In the review of literature, five

key external factors were identified, which had a high degree of influence in the situation in Yemen:

- (1) *Ongoing conflict* between DFA in the north and IRG separatists in the south has created an invisible border in Yemen, leading to population displacement, supply network disruptions and severe damage to civilian and economic infrastructure.
- (2) *Lack of infrastructure development* refers to the state of infrastructure development before the start of the conflict, including an outdated water network, poor road conditions, limited telecommunications network and vulnerable power grid. This state of vulnerability reduced the ability to recover from damage sustained during the conflict.
- (3) *Extreme weather events* include droughts, heavy rainfall, floods, cyclones and climate change-related disasters. These have negative impacts on existing infrastructure by damaging transportation systems, agriculture, water supply and the energy sector.
- (4) *Cultural and social factors* such as the high population density in urban environments; frequent use of remittances; societal hierarchies, including the status of women, children and other at-risk groups. This influences hygienic knowledge and customs, ranging from personal hygiene habits to burial practices, which may pose a risk to public health.
- (5) *Market functionality* refers to the stability of national, regional and local markets that the population relies upon for basic goods and services. Market functionality is necessary for CVA and must be assessed before and intervention takes place.

The effects created by these external variables are presented in the following subsection, which provides the basis of the model through the identification of causal relationships.

3.4 Consequences of compounding factors

Individual risk factors in complex emergencies interact with and exacerbate other factors, which can cause both cascading effects and feedback loops (Hammer *et al.*, 2018). Tables 1–5 summarize the ways in which the external factors affect the system by highlighting important causal relationships derived from reports and literature. Several of the factors are overlapping with one another, due to the fact that the majority of variables have multiple inputs and outputs.

Table 1 presents the effects of the ongoing conflict between the DFA in the north and IRG in the south. The continuous fighting has damaged the social, physical and economic infrastructure in Yemen. Basic health and education services quickly became inaccessible or inoperable in embattled areas. Food and water shortages became common as a result of the damaged water and supply networks. The World Food Programme (WFP) notes that the country is extremely fragile due to the reliance on imported food and volatile local currency (Caccavale *et al.*, 2018). Despite the desperate need for functioning seaports in Al-Hudaydah and Aden, both have been damaged since the start of the conflict and are operating at reduced capacity (ACAPS, 2019). As infrastructure deteriorates, so does the transportation systems that carry commodities and valuable exports. The economic collapse and insecurity drives mass internal displacement, leading to overcrowding in urban environments, and further reduces the availability of goods in those areas.

Before the start of the conflict, the infrastructure in Yemen was already in inadequate condition with limited energy supply from state-owned power plants, neglected roads primarily built in the 1970s and 1980s and inefficient water extraction methods that quickly drained the country's primary aquifers (Medicini, 2014). The economic downturn in 2008, Arab Spring in 2011 and subsequent events that led to the start of the civil war in 2015

Second-order effects	Causal relationships	References
Damage to infrastructure	<p><i>Lack of basic services</i></p> <ol style="list-style-type: none"> (1) Damage to infrastructure, such as Al-Hudaydah port, caused supply chain disruptions affecting public and private services (2) Disruption of power supply and water network, causing water contamination and accumulation of solid and human waste 	ACAPS (2019), Chaignat and Monti (2007), Federspiel and Ali (2018)
Economic collapse	<p><i>Lack of basic commodities</i></p> <p>Diminished local currency and purchasing power</p> <ol style="list-style-type: none"> (1) An estimated 50% economic contraction since 2015 (2) 81% of Yemenis living below poverty line (3) Low beneficiary purchasing power reduced demand for goods (4) Reduced beneficiary purchasing power reduced supplier purchasing power (5) Price inflation, coupled with reduced purchasing power, increased needs of food, water, medicine and shelter <p><i>Lack of basic commodities</i></p> <p>Price inflation</p> <ol style="list-style-type: none"> (1) Inflated transportation and production costs (2) Cost of food basket increased by 94% since 2015 (3) Wholesalers withhold supplies due to highly volatile exchange rates and lack of foreign currency, retailers may not able to restock regularly, adding up the prices (4) Affects usability and feasibility of CVA programs <p><i>Lack of basic services</i></p> <p>Increased unemployment rate:</p> <ol style="list-style-type: none"> (1) Employment and income opportunities diminished since 2016 (2) More than 600,000 jobs estimated to have been lost mainly in agriculture and service sector (3) Health-care workers without pay for more than 10 months, with many leaving their positions 	<p>ACAPS (2020a), Caccavale <i>et al.</i> (2018), Federspiel and Ali (2018), WHO (2017)</p> <p>ACAPS (2020a), Caccavale <i>et al.</i> (2018), Cash Learning Partnership (CaLP) (2018), FAO <i>et al.</i> (2018)</p> <p>Caccavale <i>et al.</i> (2018), WHO (2017)</p>
Population displacement	<p><i>Overcrowding</i></p> <ol style="list-style-type: none"> (1) Displacement may reduce the amount of clean water available per person (2) 3.6 million internally displaced persons due to the conflict 	Caccavale <i>et al.</i> (2018), Chao <i>et al.</i> (2014), UNHCR (2020)

Table 1.
Main compounding
factors related to the
ongoing conflict

(continued)

Second-order effects	Causal relationships	References
Power cuts and fuel shortages	<p><i>Lack of basic services and commodities</i></p> <ol style="list-style-type: none"> (1) Fuel shortages reduce the possibility of water trucking, while the major cost of water trucking is the price of fuel (2) Most fuel is imported through Al-Hudaydah and Aden ports, while the ports were blocked due to the conflict and road to the main cities were damaged (3) Electricity and water network cuts shut down some of the health and education facilities (4) Fuel scarcity contributed to low level of imports, currency crisis and poor supply of goods into local markets 	ACAPS (2019), Caccavale <i>et al.</i> (2018)

Table 1.

Second-order effects	Causal relationships	References
Inadequate water supply	<p><i>Lack of basic services and commodities</i></p> <ol style="list-style-type: none"> (1) Lack of clean water drives people, who are often displaced, to find alternative water sources that may be contaminated (2) Delivery of water trucking by humanitarian organizations can provide clean and safe water to affected population. However, the lack of road infrastructure and lack of fuel has made it difficult for water trucking delivery (3) Lower import levels reflect a lack of shipping confidence due to heavy restrictions and poor port infrastructure 	Caccavale <i>et al.</i> (2018), Chao <i>et al.</i> (2014), Federspiel and Ali (2018)
Power cuts and fuel shortages	<p><i>Lack of basic services and commodities</i></p> <ol style="list-style-type: none"> (1) Inadequate infrastructure limits how waste is disposed of, leading to improper waste management practices (2) Failure to deliver OCVs until 16 months after cholera outbreak (3) Only 45% of health facilities operational since beginning of conflict in 2015 	Federspiel and Ali (2018), Fuss (2016), WHO (2017)

Table 2.

Main compounding factors related to the lack of infrastructure development

hindered efforts to further develop Yemen's infrastructure. Since the start of the conflict, extensive damage has been caused to the key networks, crippling logistic activities and hindering humanitarian efforts. The Al-Hudaydah seaport suffered from airstrikes and a blockade while a key bridge to Sana'a, where roughly 80% of the country's food traders are located, was knocked out due to the fighting. Hospitals, schools and other civilian infrastructure also suffered heavy damage.

If, according to Papadopoulos *et al.* (2017), supply chain resilience is directly affected by the quality of infrastructure prior to a disaster, then Yemen's remaining logistic constraints

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Table 3.
Main compounding
factors related to
extreme weather
events

Second-order effects	Causal relationships	References
Damage to infrastructure	<i>Lack of basic services</i>	Colwell (1996)
	(1) Weather-related events such as cyclone and flooding contribute to contaminated water sources, increasing WASH needs	
Inadequate water supply	<i>Reliance on imports</i>	Caccavale <i>et al.</i> (2018), FAO <i>et al.</i> (2018), World Bank (2020a)
	(1) High dependency on imported food and fuels (more than 90% of staple food and 544,000 metric tons of fuel per month imported)	
	(2) Monthly volumes of imported food and fuels remained below pre-blockade levels due to the damage to the road infrastructure	
	(3) Congestion at Aden port caused substantial delays to the imports process	
	(4) Failed harvest due to the water scarcity led to food insecurity	
	<i>Lack of basic services</i>	ACAPS (2020b), FAO <i>et al.</i> (2018)
	(1) Extreme water scarcity due to over-extraction of existing water points in coastal cities	
	(2) 93% of water potable in Yemen used for agriculture	
	(3) Seasonal floods contaminate water supplies	
	(4) All surface and groundwater resources are exploited beyond the level of recharge	

Table 4.
Main compounding
factors related to
cultural and social
factors

Second-order effects	Causal relationships	References
Hygienic practices	<i>Lack of basic commodities</i>	WHO (2010), WHO (2004)
	(1) Inadequate hygienic practices may be a result of educational awareness and lack of means of sanitary supplies, such as soap, chlorine and safe water	
	<i>Lack of basic services</i>	
	(1) Need awareness regarding proper burial practices for deceased cholera victims to control spread in communities	
Overcrowding	(2) Personal hygiene facilities not sanitized or non-existent in many locations	
	<i>Reliance on informal networks</i>	WHO (2004)
	(1) Large gatherings may occur in markets, queueing for distribution of relief goods or to access services	
	(2) Community involvement is needed to spread proper health-related information	
	<i>Lack of basic commodities</i>	
	(1) Urban overcrowding, combined with food and water shortages, increases the chance of traveling to access basic needs, often into crowded environments	

Second-order effects	Causal relationships	Sources
Economic collapse	<p><i>Lack of basic commodities;</i> <i>Inflation and hyperinflation of prices</i></p> <ol style="list-style-type: none"> (1) Wholesalers withhold supplies due to highly volatile inflation and exchange rates and lack of foreign currency. Thus, retailers may not be able to restock regularly, driving demand shortages and price increases (2) Poor exchange rate resulted due to malfunctioning banking system, trade deficit and blockade of air and seaports in 2017 <p><i>Purchasing power</i></p> <ol style="list-style-type: none"> (1) With the depreciation of currency exchange value of Yemeni riyals, humanitarian organizations faced significant exchange losses, as they were bound to work at a negotiated exchange rate, which did not necessarily capture the difference between official and parallel rate (2) Local traders had to resort to advance payment, tying up their funds 	<p>Caccavale <i>et al.</i> (2018), FAO <i>et al.</i> (2018), WHO (2017)</p> <p>ACAPS (2020a), World Bank (2020a)</p>
Reliance on informal networks	<ol style="list-style-type: none"> (1) Informality of retail market in Yemen creates difficulties establishing legal contracts with retailers (2) As financial services and reserves dwindled, government support, including CVA via social safety net program for the most vulnerable people, has largely collapsed (3) Local markets disrupted due to the economic collapse affected by the conflict (4) Majority of Yemenis rely on remittances from abroad for livelihoods (5) Central Bank of Yemen no longer has swift code, reducing operational capacity 	<p>Cash Learning Partnership (CaLP) (2018), REACH (2017)</p>
Capacity investment	<p><i>Lack of basic services and commodities</i></p> <ol style="list-style-type: none"> (1) Many traders were unable to coordinate supply chains after the start of the conflict (2) Lack of electronic point of sale check-outs, limiting the potential for automated consumer demand analysis and stock management (3) Remittances (electronic cash transfers) from abroad were significantly reduced, partly due to restrictions imposed on transfers to Yemeni banks (4) The shift of the bank headquarters from Sana'a to Aden undermined its functioning capacity. Central Bank of Yemen in Sana'a no longer has a SWIFT code to allow external transfers, so its operational capacity is limited (5) Payment methods are limited, without credit options between main suppliers (importers and milling factories) 	<p>ACAPS (2020a), Cash Learning Partnership (CaLP) (2018), REACH (2017), World Bank (2020a)</p>

Table 5.
Main compounding
factors related to
market functionality

after the conflict must also be attributed to the lack of initial development. Table 2 demonstrates how, even with international humanitarian organizations present in the country, the distribution of supplies can still be disrupted due to reduced port capacity, restricted road access and a limited number of water pumping sites, creating a situation vulnerable to epidemics. Controlling an outbreak of cholera requires immediate action and rapid treatment (Connolly, 2005). Medical supplies and personnel are needed for effective containment, often relying on stockpiles and pre-positioned inventories (Dasaklis *et al.*, 2012). Delays in the response effort, due to disruptions in the supply chain or constraints in logistic capacities, can severely hinder efforts for containment. For this, we have attributed only one delay in the model to denote the importance of how a delay of in-kind aid affects the availability of basic commodities to people in need.

Environmental causes related to the spread of cholera are well documented in literature, owing to the fact that the primary mode of transmission is through water sources. As noted in Table 3, extreme weather events, including global climate change, can lead to flooding, droughts and cyclones in Yemen, which has ripple effects in the consumption patterns in the population. The efficient use of clean water and sustainable methods of extracting groundwater is crucial for the development of Yemen moving forward. While extreme weather events are uncontrollable, the ability to recover from them is attributed to resilience and infrastructural development.

Factors stemming from cultural and social norms (Table 4) are not as easy to remedy but must be addressed with respect to their implications for the spread of cholera. Involvement of local community leaders is important to help identify vulnerable groups, understand culturally sensitive customs and disseminate health-related knowledge (WHO, 2004). In Yemen, the lack of education can undermine efforts to control cholera by lack of awareness of hygienic practices. For this, OCV campaigns have two purposes: to administer vaccinations and to disseminate information for cholera awareness. The GTFCC (2017) notes that safe food preparation, adequate hand-washing techniques and proper burial practices must be observed to reduce the risk of transmitting cholera to healthy individuals.

Table 5 summarizes how markets affect the purchasing power of beneficiaries and suppliers, along with banking regulations and the dependence upon remittances in the country. This model labels *market functionality* as an external variable that is not affected by other variables in the model. As the study of influential factors on markets is complex enough, the purpose the variable serves for this model is to primarily show how in-kind assistance and CVA are affected by the existence of functioning markets. Given the logistic constraints in Yemen, CVA is a cost-effective solution that can complement in-kind assistance. Cash transfers for WASH products can create a large impact for targeted communities, but rely on markets and financial service providers for successful implementation. If markets do not function, then the provision of CVA does not provide value to beneficiaries. Thus, a market-based solution is encouraged that utilizes both CVA and in-kind assistance to provide flexible aid to beneficiaries, potentially increasing resiliency if one form cannot be utilized.

The relationships discussed in the tables form the basis for the construction of the CLD. The following subsection presents the CLD in three parts: the cholera outbreak, the response and the context. Each component of the model is examined both individually and in relation to the other parts.

3.5 Causal loop diagram (CLD)

CLDs represent the qualitative part of an SD by focusing on relevant causes and effects in the considered system. A CLD consists of variables, which are linked by arrows. Each arrow is indicated by either a plus (+) or minus (−) sign. A positive link, i.e. one denoted by a plus sign, indicates that an increase in the cause leads to an increase in the effect, while a negative sign means that if the cause increases, the effect decreases. Additionally, delays can be modeled to

specify that a certain effect occurs at a later point in time. Such delays are indicated by double lines (||) that cross the link in our representation. By visualizing these relationships between the considered variables, feedback loops in the system can be identified. Such loops can either have a balancing (*B*) or reinforcing (*R*) effect on the system to highlight how the variables interrelate. For a detailed description of CLDs, refer to [Morecraft \(2007\)](#).

The CLD designed in this study has three core components: (1) an SIR module depicting the transmission of cholera throughout a population, (2) a module that represents the humanitarian efforts to provide relief and (3) a module containing the compounding internal and external factors that influence component (2) and subsequently (1). The final version of the model is not comprehensive, nor should it be, according to [Stermann \(2000\)](#). Rather, the purpose of the model is to provide a structural view of the humanitarian response to a cholera outbreak to gain insight into the existing feedback loops that govern the system.

The model is presented beginning with the contextual module describing the internal and external factors in Yemen, followed by the SIR module, and finally, the humanitarian relief model.

[Figure 1](#) represents the complex web of dynamic factors in the Yemen context, as described in [Tables 1–5](#). Each of the external factors creates second-order effects, which have key consequences related to preparedness and response to cholera outbreaks. The consequences contribute to the growing needs of an affected population. The variables *lack of basic commodities (food/medicine/WASH/fuel)* and *lack of basic services (health/education/financial)* both refer to the basic needs approach standards ([Save the Children, 2016](#)) regarding the lack of access to, and availability of, goods and services of substantial quality across multiple sectors. The deprivation of basic goods and services have a direct impact on WASH-related needs, which are the most important factors for preventing and controlling cholera outbreaks ([GTFCC, 2017](#)).

Relief efforts seek to lessen the magnitude of the consequences through humanitarian interventions with in-kind assistance and CVA. The primary interactions of providing in-kind assistance are denoted on the left-hand side of the model, while CVA is represented on the right-hand side. Local market functionality affects *cash/voucher distribution*, which influences the purchasing power and can reduce the reliance on remittances and other informal financial networks. By contrast, *in-kind distribution* is influenced by the identification of material needs in targeted populations and requires physical extant physical infrastructure. In Yemen, both forms of relief efforts are utilized and are not mutually exclusive, contributing to the overall impact on the population receiving assistance. One key distinguishing factor between the two methods of delivering assistance is the delay associated with in-kind distribution. The delays are a result of the poor state of infrastructure in Yemen and reduce the efficiency of in-kind assistance.

In [Figure 1](#), the context is depicted to show the needs, the humanitarian response, and the factors which influence those variables. To understand how the humanitarian response impacts cholera, an intermediary module is needed to describe the response in relation to the population. [Figure 2](#) further examines the relationship between the needs of the population and efforts from humanitarian organizations to provide relief.

[Figures 1 and 2](#) are connected by six variables: four to represent the needs, (*reliance on imports*, *lack of basic services (health/education/financial)*, *lack of basic commodities (food/medicine/WASH/fuel)* and *reliance on informal networks*) and two to represent the modes of relief (*efforts to provide in-kind assistance* and *efforts to provide cash/voucher assistance*). In [Figure 2](#), there are two dynamic feedback loops that describe how humanitarian organizations respond during a complex emergency. The module is adapted from the work of [Gonçalves \(2011\)](#), with two distinctions. First, we show CVA and in-kind assistance through two separate balancing loops, as they are influenced by different variables in [Figure 1](#). Second, we use SDGs in the model as targets for providing relief, which are

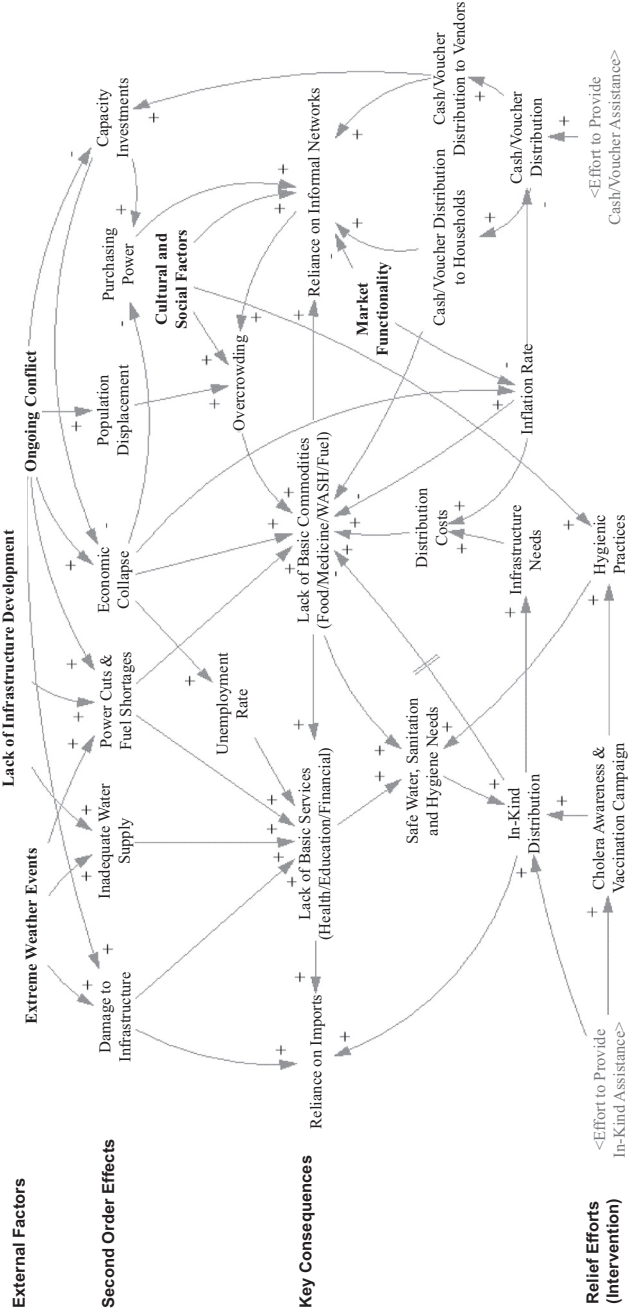


Figure 1.
Compounding factors
in the Yemen context

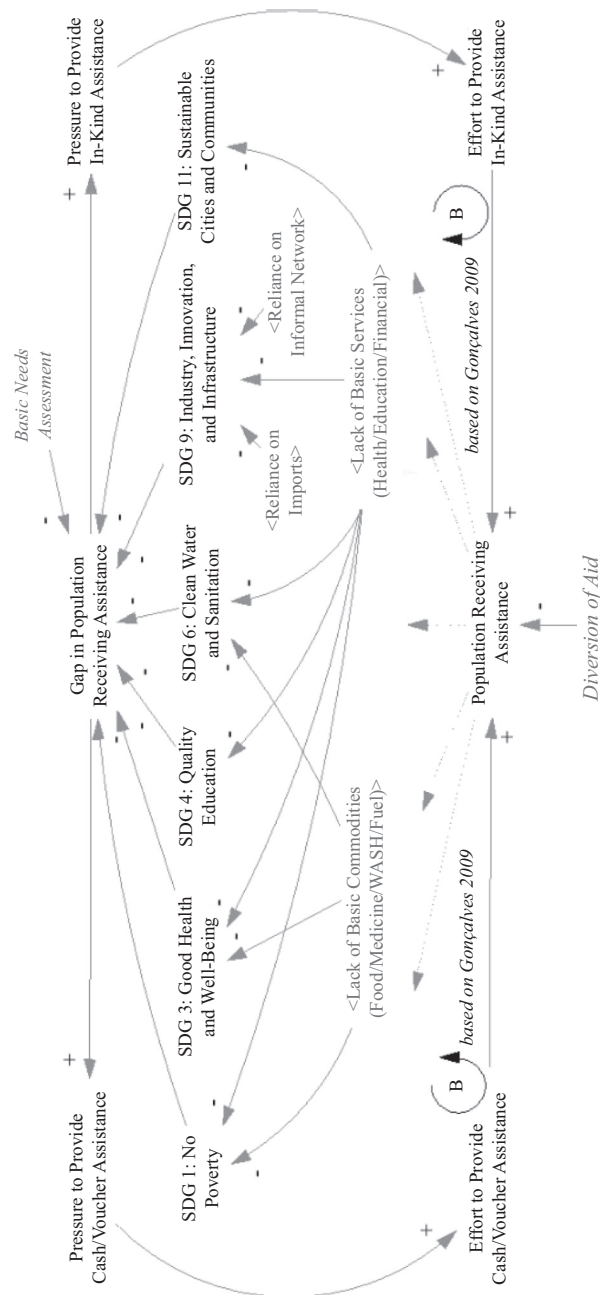


Figure 2.
Humanitarian efforts
and relief loops,
adapted from
Gonçalves (2011)

connected to the *key consequence* variables from Figure 1. These variables are the result of the deteriorating situation in Yemen and have a negative impact on the progress toward the achievement of the six SDGs.

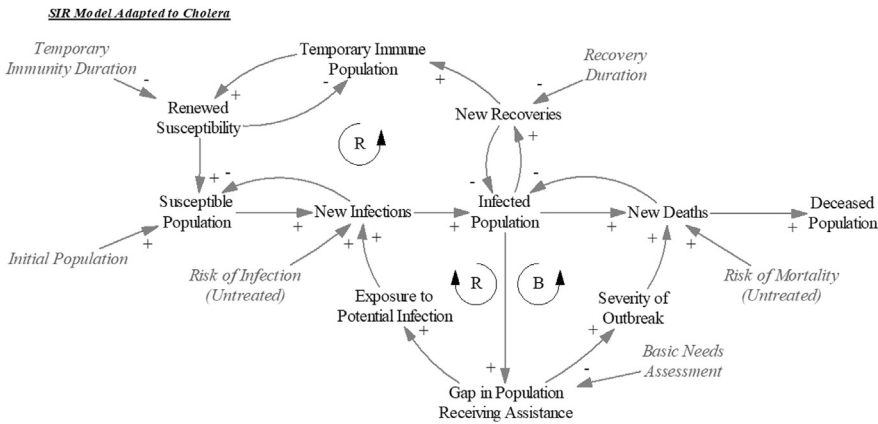
In humanitarian settings, providing the appropriate response requires understanding of the needs of local population. The *basic needs assessment* is a multi-sectoral approach to quantify the needs of a population and inform humanitarian organizations how to provide an effective response (Save the Children, 2016). The concept of the basic needs is defined as “essential goods, utilities, services or resources required on a regular, seasonal, or exceptional basis by households for ensuring survival and minimum living standards, without resorting to negative coping mechanisms or compromising their health, dignity and essential livelihood assets” (ILO, 1976). We divided basic needs into basic services and basic goods. The assessment explores barriers to a population meeting their basic needs, in terms of access, availability and quality of goods and services. Accurately identifying and specifying the gap in needs can lead to a better formulated humanitarian response plan.

Humanitarian organizations measure their performance on the difference between the identified population who need assistance (*gap in population receiving assistance*) and the number in a population who receive assistance (*population receiving assistance*), with a desired target level of performance. If a gap in performance exists, it requires managerial attention to correct poor performance observed in the field. More resources may be allocated to mitigate the compounding risks revealed in, for instance, the basic needs assessment. Depending on the context and environmental situation, humanitarian organizations may decide to provide in-kind assistance, CVA or a combination thereof. Humanitarian organizations are consistently under pressure to provide relief in one of the modalities (*pressure to provide in-kind assistance* and/or *pressure to provide cash/voucher assistance*), as resources (money, supplies, people and logistics) and time are often limited. This leads to an increasing effort (*effort to provide cash/voucher/in-kind assistance*) immediately by allocating more resources toward relief capacities, which positively impacts the *population receiving assistance*. The model includes the variable *diversion of aid*, with a negative impact on *population receiving assistance*, noting that the delivery of aid in conflict zones carries an increased risk of delay or failure, due to confiscation by warring factions, imposition of illegal tariffs, existence of black markets or negative coping mechanisms among beneficiaries (Lischer, 2003).

The six SDG variables refer to specific targets directly and indirectly related to impacts on cholera reduction. The link between the SDG targets and indicators and the problem context are further discussed in Section 4, with specific references to the situation in Yemen. At this stage, the model shows both short- and long-term effects of a *population receiving assistance*. In the short term, there is a reduction in the *gap in population receiving assistance*, and in the long term, there is a positive impact toward the achievement of specific SDGs. Responding to cholera outbreaks is multi-dimensional, requiring immediate action for treatment and control and long-term development to prevent future outbreaks (Connolly et al., 2006). Therefore, the model includes both impacts as they work toward a common goal of reducing the risk of cholera infections, as shown in Figure 3.

Figure 3 is connected to Figure 2 through the variable *gap in population receiving assistance*. This module has been adapted from the widely used SIR model for disease transmission throughout a population (Anderson and May, 1991). A susceptible population is at risk to infection through exposure to the disease. Once infected, individuals may either recover or die. If recovered, individuals may be temporarily immune to cholera, before their susceptibility to the disease is renewed (Koelle et al., 2005).

Connecting the SIR module (Figure 3) to humanitarian assistance in a complex emergency (Figure 2) advances two established models in literature and expands upon them by the inclusion of contextual factors (Figure 1). When an outbreak occurs amidst a population with



Compounding
factors of
epidemics

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Figure 3.
SIR model of cholera
outbreak, adapted from
Anderson and
May (1991)

unmet needs, there is a greater risk of exposure to the disease, contributing to the total infected population. The infected population must be treated rapidly to control the spread of the disease, thus contributing to the population requiring assistance and creating a reinforcing loop. Simultaneously, a gap in a population receiving assistance may exacerbate the severity of the outbreak (Dasaklis *et al.*, 2012) and increase the mortality rate.

The inclusion of the context and relief efforts attempts to provide a whole-system perspective, which is often lacking in SIR only models (Homer and Hirsch, 2006). Connecting the three modules together, the model addresses how cholera spreads throughout a population, how humanitarian aid is used to prevent and control outbreaks and internal and external factors that form the boundaries of the system.

The following section provides a discussion of key factors and relationships included in the model, the process validating the model and limitations to the model.

4. Discussion

From the structure and causal relationships present in the model, insights can be drawn toward the connection between supply chain functionality and response to disease outbreaks in complex emergencies. In particular, the model reveals a holistic approach toward cholera-relief operations, rather than several piecemeal approaches. The inclusion of both CVA and in-kind assistance provides the perspective of flexible delivery options to provide relief during a cholera outbreak, while the inclusion of SDGs provides a long-term perspective for the prevention of future cholera outbreaks.

4.1 Sustainable development for cholera prevention in Yemen

SDGs are an ambitious set of goals that seek to improve the quality of life across the globe. While the 17 SDGs are broadly defined, the UN has also pushed for localization of the goals, so they may be adapted to fit the needs of local and regional communities (UNDP, 2016). Each of the SDGs contains several specific targets that form a roadmap toward achievement of the goals. This research supports this concept by utilizing the SDG targets and indicators as goals for the prevention of future outbreaks of cholera in Yemen.

The model reveals causal relationships in the Yemen context, revealing how supply disruptions occur due to external factors. These factors create needs, represented by the *key consequence* variables in Figure 1 and in Figure 2, which connect to the SDGs. In Table 6, the four *key consequence* variables are listed along with specific references to the context in Yemen and the individual SDG indicators that they address.

Table 6.
Connecting key
consequence variables
to SDGs

Key consequence variables	Causal relationships	SDG indicators	References
Lack of basic commodities	(1) 20 million people food insecure and 10 million suffer from extreme levels of hunger	1.5.1 Number of deaths, missing persons and persons affected by disaster per 100,000 people	FAO <i>et al.</i> (2018), Federspiel and Ali (2018), UNOCHA (2019)
	(2) 17.8 million people lack access to safe WASH supplies	3.9.2 Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe WASH for all services)	
	(3) 19.7 million people lack access to adequate health supplies (medicine and vaccines)	3.b.3 Proportion of health facilities that have a core set of relevant basic medicines available and affordable on a sustainable basis	
	(4) Lack of availability of fuel affected production systems, including agriculture and supply of safe water supply	6.3.2 Proportion of bodies of water with good ambient water quality	
	(1) Fuel continues to be scarcely available		UNOCHA (2018)
	(2) Trade through Al-Hudaydah, Yemen's busiest port, is restricted, reducing the supply of basic commodities		Caccavale <i>et al.</i> (2018)
	(1) Lack of availability of fresh food products in the local markets, leading to poor consumption and hunger		Caccavale <i>et al.</i> (2018), Federspiel and Ali (2018)
	(1) Lack of food leads to malnutrition, reducing immunity to disease		
	(2) Due to blockades, lack of health-related basic goods led to lack of preventative care and treatment		
	(3) Lack of clean water drives people, who are often displaced, to find alternative water sources that may be contaminated		

(continued)

Key consequence variables	Causal relationships	SDG indicators	References
Lack of basic services	<div><div>(1) Access to basic services such as water, sanitation, health, education, agriculture and veterinary services has been constrained</div><div>(2) Only 46% of health facilities functional before start of conflict</div><div>(3) More than 2 million children have no access to schools</div><div>(4) Schools have been damaged by conflict and airstrikes</div><div>(5) Lack of funding for teacher's salaries led to teacher strikes</div><div>(6) More than 600,000 jobs estimated to have been lost, mainly in agriculture and service sector</div><div>(7) Limited access to financial service providers, especially in remote areas</div><div>(8) Liquidity issues disrupt availability of physical cash</div><div>(9) Volatile inflation rate reduces beneficiary purchasing power</div><div>(10) Insufficient capacity in financial institutions</div></div>	<div><div>1.4.1 Proportion of population living in households with access to basic services</div><div>3.8.1 Coverage of essential health services</div><div>4.7.1 Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in (a) national education policies, (b) curricula, (c) teacher education and (d) student assessment</div><div>6.1.1 Proportion of population using safely managed drinking water services</div><div>6.2.1 Proportion of population using (a) safely managed sanitation services and (b) a hand-washing facility with soap and water</div><div>11.5.2 Direct economic loss in relation to global gross domestic product (GDP), damage to critical infrastructure and number of disruptions to basic services, attributed to disasters</div></div>	UNOCHA (2019) Cash Learning Partnership (CaLP) (2018), ACAPS (2020a)

(continued)

Table 6.

Table 6.

Key consequence variables	Causal relationships	SDG indicators	References
Reliance on informal networks	<p>(1) Informality of retail market in Yemen increased difficulty to establish legal contracts with retailers</p> <p>(2) As financial services and reserves dwindled, government support, including cash assistance via social safety net program for the most vulnerable people has largely collapsed</p> <p>(3) Remittances (electronic cash transfers) from abroad have significantly reduced, partly due to restrictions imposed on transfers to Yemeni banks (CVA)</p> <p>(4) Payment methods are limited and informal, without credit options between main suppliers (importers and milling factories)</p> <p>(5) Lack of mobile banking and digital solutions keeps reliance on physical cash, causing liquidity issues in remote areas</p>	9.a.1 Total official international support development assistance plus other to infrastructure	Caccavale <i>et al.</i> (2018), UNOCHA (2019) REACH (2019)
Reliance on imports	<p>(1) High dependency on imported food and basic commodities, with more than 90% of staple food and 544,000 metric tons of fuel per month imported</p> <p>(2) In 2018, the government of Yemen adopted Decree 75, which requires companies to finance imports of six basic goods through the central bank</p>		UNOCHA (2019), FAO <i>et al.</i> (2018)

In the model, two clusters of vulnerabilities emerged, needs and dependencies. *The lack of basic commodities (food/medicine/wash/fuel)* and *lack of basic services (health/education/financial)* both refer to the lack of access to, and availability of, goods and services of substantial quality. Protracted crises, such as the one in Yemen, creates acute and chronic needs, both of which must be addressed for the restoration of livelihoods. Scarcity of food, medicine, fuel and WASH products has forced mass displacement and is a driver of insecurity. At the same time, the lack of basic services reflects the deteriorating infrastructure, severely limiting recovery and development options in the country. Addressing these needs has an impact on SDG 1 (no poverty), SDG 3 (good health and well-being), SDG 4 (quality education), SDG 6 (clean water and sanitation) and SDG 11 (sustainable cities and communities). WASH supplies are not the only means necessary to prevent cholera, but also stronger education systems and functioning health services that are available to those who need it.

The resulting lack of commodities and services also highlights two dependencies for providing assistance in Yemen, *reliance on informal networks* and *reliance on imports*, in this case. These variables represent underlying features of the Yemen context, forming parameters to how responses can be effectively delivered. Unlike the needs listed above, the dependencies relate primarily to one SDG indicator, 9.a.1, which calls for total international support to improve infrastructure and support development. Reducing the risk of infection of cholera means responding to any current outbreaks and working to prevent future outbreaks through preparedness measures.

Humanitarian interventions typically have short-term, specific goals, while development projects are generally long term with broadly defined goals. However, both share the same common goal of preventing further crisis and reducing the need for humanitarian assistance in the future. In this light, framing humanitarian assistance toward the attainment of specific SDG targets works in the direction of sustainable solutions and links preparedness and development goals together. As CVA is one of the primary mechanisms to deliver assistance in Yemen, there is a strong potential to link relief aid to development goals, which is one of the primary recommendations given by the Overseas Development Institute to improve the effectiveness of humanitarian aid (ODI, 2015).

The continued development of infrastructure can increase the number of options available to humanitarian agencies responding to emergencies. HSC vulnerabilities are a direct result of insufficient infrastructure; thus, it is in the best interest of humanitarian agencies for the persons of concern in emergencies to continue investing in reliable and sustainable transportation, energy and technology. Conflict, extreme weather events and economic crises will continue to create complex emergencies, but by continually developing, maintaining, and protecting basic infrastructure from damage, there is an opportunity to strengthen protection of vulnerable populations against preventable diseases, such as cholera.

4.2 Model validation

As the process of building a model is iterative by continuously revisiting several steps to improve the model behavior and structure, so is the process of validating an SD model to determine its adequacy to represent real-world systems (Sterman, 2000). Several qualitative and quantitative methods exist for validation, and serve different purposes depending on the model structure. As the model used in this research did not contain quantitative data, the primary purpose of validation was to gain confidence in the model boundaries, assess the structure of the model and to discuss the relation to real-world counterparts. To accomplish this, semi-structured interviews were chosen as the primary method of validation, which allows respondents to ask questions, elaborate on discussion points and provide insights about causal relationships that might not be available through secondary data (Andersen *et al.*, 2012).

A series of interviews and correspondence took place with an independent WASH consultant who has led the coordination of a working group for the GTFCC. The interviewee is an expert in the problem context, specializing in humanitarian response to cholera outbreaks. Furthermore, interviewee worked directly with the cholera outbreak during the conflict in Yemen. The pattern of validation followed iterations of model analysis and revisions, driven by discussion regarding model parameters, variables, assumptions and limitations with respect to the real-world context. When feedback was received for the model, revisions were made, then discussed again with the key interviewee until a satisfactory level was achieved.

4.3 Model limitations

As stated by [Grad et al. \(2012\)](#), modeling of complex problems is limited by the assumptions made and boundaries formed to create the model. One of the goals of this project was to depict the complexity of the situation in Yemen and how humanitarian efforts must consider a myriad of potential scenarios for preparedness and response. The CLD in this research was formulated around logistics and supply chain-related constraints that impact cholera prevention, treatment and control through humanitarian interventions. Thus, several variables were not included in the model, such as socioeconomic factors which influence *market functionality*.

Additionally, the model does not contain any quantitative values, as the focus of this work was to provide a clear and easy-to-understand representation of the compounding factors. A quantitative analysis of this magnitude would have several factors to compute simultaneously; thus, reliability would be highly difficult to achieve. As noted by [Coyle \(2000\)](#), quantitative modeling of dynamic systems with high degrees of uncertainty may yield misleading results. This model aimed to provide value to practitioners through its depiction of complex relationships between system variables. Despite this, quantification could provide additional value if assumptions and model boundaries are clearly stated. Several SIR cholera models contain a stock and flow diagram, which would be a useful component for an adaptation to this model. In CLD only models, behavior is only inferred, but the inclusion of stock and flow diagrams can increase precision of relationships through detailed variable behavior ([Lane, 2008](#)). This additional step is encouraged for future research.

5. Conclusion

Communicable diseases are a major cause of mortality during complex emergencies ([Connolly, 2005](#)). Cholera is especially prevalent in conflict settings, despite being a preventable disease with international efforts to eradicate it. This research has taken a systems perspective to depict complex factors in a manner that can improve understanding of relationships where numerous uncertainties exist. By utilizing SD and developing CLDs, it was possible to identify and visualize key internal and external factors that either aggravate or mitigate the risk of cholera, which was a key aim of this study.

The CLD developed in this research extends two previous models and presents key factors in a way that allows practitioners and policymakers to have a systematic view of the numerous factors that have complex cause and effect relationships, highlighting potential unintended consequences. When designing assistance programs in a complex emergency, it is important to look at both the short- and long-term needs and dependencies of a population during a cholera outbreak. The findings indicate that there is a need to link both humanitarian and development efforts together with peace mediations to terminate the conflict, or to reduce its intensity. Some factors are possible to address in the short term (i.e. humanitarian assistance and conflict mediation), while others such as education or infrastructural investments need a long-term development approach. Nevertheless, both measures should be taken if humanitarian efforts are to be sustained.

There is also a need to protect supply chain infrastructure from purposeful attacks and damage, due to the importance for civilian populations. The review of causal relationships in the model affirms the strong coupling between humanitarian response capacity and the level of infrastructure development in Yemen. The country's infrastructure was underdeveloped prior to the conflict, but the lack of maintenance and deterioration due to the conflict further restricted the flow of goods and reduced the number of services available. The inadequate supply chain infrastructure, including ports, roads, water networks and electrical grids, was determined to be a key factor contributing to the increased risk of cholera outbreaks. While the literature demonstrated that resilience in HSCs is also linked to the level of infrastructure (Papadopoulos *et al.*, 2017), the developed CLD in this study illustrates how humanitarian organizations are able to provide assistance against these settings. Using both in-kind assistance and CVA simultaneously provides flexibility to counter supply chain and market disruptions. Additionally, assistance must be multi-dimensional, taking immediate action for cholera treatment and control and sustaining long-term development to prevent future outbreaks. Thus, formulating context-specific solutions is encouraged, which may potentially improve resiliency toward disruptions through multiple forms of assistance.

Connecting the model to SDGs highlights which targets and indicators are most important to address in the complex emergencies. Maintenance and protection of existing infrastructure and further development at the country level are beyond most of humanitarian assistance operations, as they require large-scale investments. Using the SDGs provides a roadmap for how to develop infrastructure where it is most needed. Visual representation of variable inter-relationships is easier to understand than text; thus, the model could be used as a tool for educational purposes and program preparation to align humanitarian and development initiatives. However, development of infrastructure alone is not enough, as there is a simultaneous need for multi-dimensional improvements, such as education related to hygiene. Therefore, to counter the effects of external factors, flexible assistance and alignment of objectives across sectors is needed to mitigate the risk of cholera outbreaks.

In addition, while there are differences between cholera and COVID-19, caused by the airborne SARS-CoV-2 virus, some of the factors, such as the need for logistics and health-care infrastructure, are relevant in both cases. Moreover, if a vaccine against the SARS-CoV-2 virus will require temperature-controlled transportation, then relevant infrastructure for distribution will be necessary to complete vaccination programs. While this model is built around the cholera epidemic, it can be adapted to assess responses for other infectious diseases.

The results of the research should be taken forward, which may include testing the model in different settings (e.g. country, region or type of disease) as well as incorporating quantification through stock and flow diagrams on well-defined small-scale problem instances. There is also the possibility for action research, applying the model during an intervention and assessing the impacts of the various responses. Further work might also include surveys to collect views of practitioners on the importance of each factor and the relationships between them, which may uncover additional factors that influence how responses are formulated.

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APPENDIX 3

Article #3

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Preparing for cash and voucher assistance: developing capabilities and building capacities

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ABSTRACT

The growth of cash and voucher assistance in humanitarian settings has led to a recognition of the importance of developing preparedness measures to ensure programmes are designed and implemented effectively. An organization's ability to deliver cash and voucher assistance (CVA) is dependent upon available capacities and acquired capabilities, emphasizing the importance of information-sharing networks and the continual development of skills and knowledge. This chapter discusses how humanitarian organizations can improve their level of preparedness and presents a practical case example for analysis.

INTRODUCTION

Over the past decade, cash and voucher assistance (CVA) has changed how humanitarian organizations prepare for and respond to crises. What was once a limited modality has become a core component of humanitarian responses, now accounting for approximately 17.9% of total international relief provided by humanitarian organizations, more than double the amount in 2016 (Jodar et al., 2020). As the evidence has mounted about the benefits of CVA in relation to efficiency and effectiveness, international humanitarian organizations have shifted their approach by institutionalising and routinely considering CVA in their response planning. Global initiatives, such as Workstream 3 of the Grand Bargain, advocate for the systematic use of CVA across the humanitarian sector to ensure better coordination, delivery, and monitoring of cash assistance (Metcalf-Hough et al., 2021). These movements have gathered support from United Nations (UN) agencies, Red Cross and Red Crescent Movement (RCRCM) societies, and non-governmental organizations (NGOs), aiming to create a large impact across the humanitarian sector.

The integration of CVA as a main-stay mode of providing aid has led organizations to recognize the importance of developing preparedness measures for CVA programming. These measures must be formed in the preliminary stages of planning, well before implementation takes place to ensure continuity of programming throughout the intended operational cycle (Castillo, 2021). Thus, there has been a global push for organizations to be 'cash ready' (Spencer et al., 2016), or 'cash proficient' (UNHCR, 2016), to provide efficient, effective, and timely responses.

However, preparing for CVA programming is a challenging task that requires logistical competencies, such as forecasting, planning, and procurement (Heaslip et al., 2019), developed capabilities (eg, operational knowledge and skillsets), and adequate capacity to deliver the assistance (e.g. physical assets, human resources, and technology) (Jodar et al., 2020). Not having these in place limits the effectiveness of CVA and may hinder the performance of operations.

This was made evident during the COVID-19 pandemic as supply chain disruptions, lockdowns, and social distancing measures interfered with ‘traditional’ in-kind assistance, leaving many humanitarian organizations rushing to set up or scale up CVA programmes. While some organizations were able to respond rapidly and provide additional cash disbursements to offset the effects of the disruptions, other organizations faced severe operational delays (Beazley et al., 2021). Merely having plans or CVA programmes in place was not a failsafe against disruptions during the pandemic though. Operations that relied on manual or analogue cash transfers experienced more interruptions from the pandemic compared to operations that utilized technology and digital transfers (Beazley et al., 2021), mainly due to social distancing restrictions. Thus, the digital divide between various countries and communities was once again brought to light, putting already vulnerable populations at greater risk through a lack of digital inclusion.

For humanitarian organizations, adapting responses to face these challenges simultaneously demonstrated the potential effectiveness of CVA programming for rapid responses as well as the need for preparedness measures and contingency planning to allow for operational flexibility. Since the start of the pandemic, over 1.3 billion individuals have received COVID-19-related cash transfers from governments or international organizations, with more expected to follow (Gentilini et al., 2021). As the quantity of CVA programmes continues to expand across diverse contexts and throughout different phases of crises, the need to retain quality in programming will also continue to increase. This infers strategic planning for the development, implementation, and monitoring of programmes throughout the entire project cycle.

This chapter explores the concept of preparedness in relation to CVA programming and provides insights from leading organizations in the field of CVA about the different interpretations of preparedness as well as actions that can lead to a greater state of response readiness. A framework is presented to illustrate how knowledge, skills, and resources affect an organization’s ability to deliver CVA, as well as how information-sharing networks and joint initiatives can affect performance. These concepts are then illustrated through a case study of a cash working group facing critical delivery challenges amid the COVID-19 outbreak.

A BRIEF INTRODUCTION TO CASH AND VOUCHER ASSISTANCE

In the humanitarian context, ‘cash and voucher assistance’ is defined as the provision of money or vouchers, either as emergency relief to address basic needs or as support for recovery activities to help re-establish livelihoods (CALP, 2018). It is also synonymous with several other terms used by humanitarian practitioners, such as cash-based interventions, cash-based relief, and cash transfer programming (Maghsoudi et al., 2021). While the terms all refer to the same concept, ‘CVA’ is adopted for this chapter for clarity and consistency, as it explicitly includes both cash transfers and voucher programmes. It must be noted that the term does not include remittances and microfinance programmes.

In relief operations, CVA may be used as a standalone form of assistance or delivered alongside goods or services in-kind. Delivery of CVA may be conducted either physically or digitally, depending on beneficiary preference, operational objectives, and context of implementation. Table 1 below presents the different mechanisms used to deliver cash and vouchers, as well as examples of each.

Table 1. Types of CVA

Modality	Means of Delivery	Types
Cash Transfer	Physical Cash Distribution	<ul style="list-style-type: none"> – Direct Cash – Check
	Electronic Transfer	<ul style="list-style-type: none"> – Pre-Paid Card – Stored-value Card – Bank Account – Debit / ATM Card – Smart Card – Mobile Money
Voucher	Physical Voucher Distribution	<ul style="list-style-type: none"> – Paper Voucher – Scratch Card
	Electronic Transfer	<ul style="list-style-type: none"> – Pre-Paid Card – Stored-value Card – Smart Card – Mobile Voucher

Source: adapted from the CALP Network (2018)

CVA is provided to individuals or households and may be given conditionally (ie, to specific qualifying recipients, such as mothers with school-aged children) or unconditionally with no qualifying requirements. Similarly, there can be restrictions on how the assistance is used. Figure 1 illustrates how these conditions and restrictions relate to spending flexibility on the side of the beneficiary. Vouchers are more restrictive as they are limited by where and how the

recipient can use them, whereas cash assistance is flexible and allows the recipient to choose how to spend the cash. CVA may have specifically designed purposes (eg, for food, water, or shelter), or be used to address multiple needs across various sectors simultaneously. In general, the more needs a programme is designed to cover, the less restrictive it will be in terms of usage by the recipients.

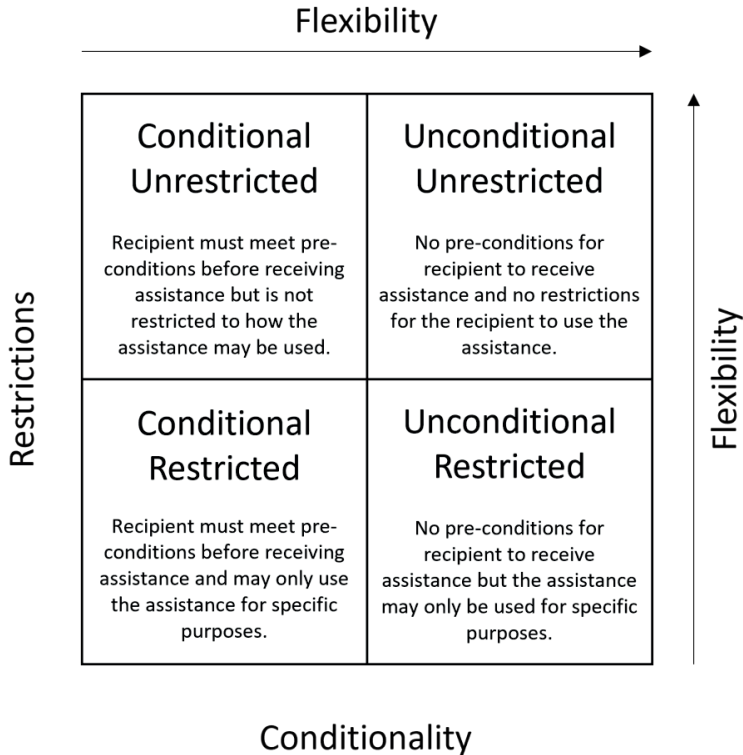


Figure 1. CVA conditionality and restrictions matrix

Providing financial assistance through cash and vouchers differs from the traditional form of aid, which provides physical goods to beneficiaries, by allowing recipients to purchase what is needed locally. As noted by Heaslip et al. (2015), this has a profound effect on the movement of goods and finances throughout the supply chain as well as the actors in the supply network. Figure 2 shows the impact this has on material and financial flows, creating a ‘pull’ effect as beneficiaries choose what is needed, rather than goods being ‘pushed’ to them from organizations. This change not only supports local suppliers but also provides empowerment and dignity of choice to the beneficiaries (Harvey, 2007). Humanitarian organizations benefit through the reduction in logistical activities (eg, purchasing, warehousing, transportation, and customs clearance) for goods already available in local marketplaces and can then focus on procuring materials that are not readily available for beneficiaries (Tatham et al., 2018). This

strategic usage of both in-kind assistance and CVA can provide operational flexibility by switching between delivery modalities depending on the situation. Furthermore, these measures are important metrics for donors when assessing the relative quality of a humanitarian operation's work (Wakolbinger and Toyasaki, 2018), which has an impact on financial flows for relief aid.

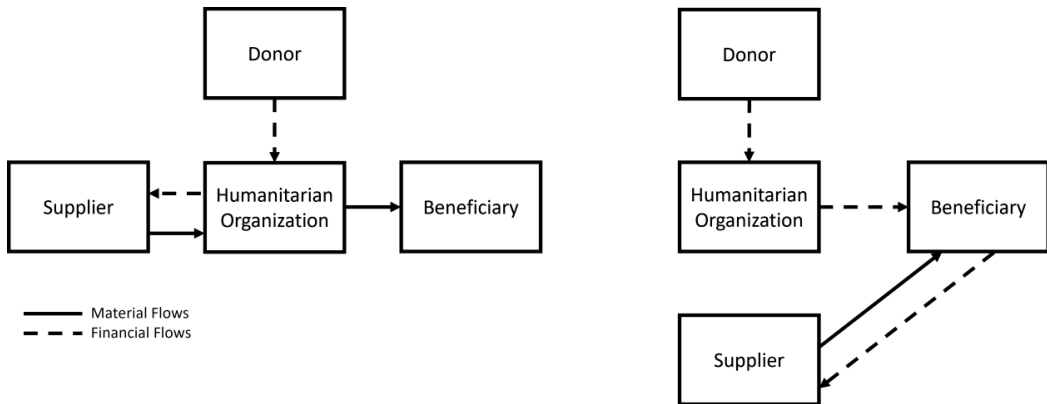


Figure 2. Change typical humanitarian supply chain flows (left) undergo through CVA programming (right); adapted from Heaslip et al. (2015)

These noted benefits have led to increased use of CVA globally in humanitarian operations, rising to a record amount of US\$6.3 billion in 2020 (Development Initiatives, 2021). United Nations (UN) agencies and the International Red Cross and Red Crescent Movement (RCRCM) accounted for 75% of the transfer amount, with the largest actors being the World Food Programme (WFP), RCRCM, and United Nations High Commissioner for Refugees (UNHCR) (Development Initiatives, 2021). This trend is likely to continue further upward as humanitarian organizations continue to expand existing operations and implement new projects (Spencer et al., 2016).

Despite the growth of CVA, further research is needed to better understand how various delivery mechanisms can be used effectively in different contexts (Maghsoudi et al., 2021). In each situation, financial constraints may change depending on the disaster phase, which also influences the effectiveness of the response (Wakolbinger and Toyasaki, 2018). Furthermore, across cultures the concept of 'cash' may carry different social meanings, creating different perceptions between actors (eg, donors, beneficiaries, and host community) of which type of aid is most suitable and how it should be distributed (Vogel et al, 2021). Therefore, CVA programmes must not only be feasible and measurable but also contextually appropriate. For

this, numerous tools and guides exist to help practitioners make informed decisions regarding CVA programming.

These guides and checklists vary by complexity and purpose, and often reflect the objectives of the organization that created them. For instance, UNHCR created a CVA feasibility and analysis toolkit which uses a series of nested assessments and decision trees across various levels to determine an appropriate protection response, in line with their mandate (UNHCR, 2017). The assessments first address whether CVA is feasible and safe to use in each context, then help determine which delivery mechanism should be selected, and finally how to implement the chosen delivery mechanism (UNHCR, 2017). While the objective is to deliver the correct response according to each context, many of the CVA guides require in-depth knowledge of markets, financial service providers, and the targeted beneficiary population. According to Castillo (2021), although these decision trees and assessments are comprehensive, their practicality is often limited by the resources available to complete all the tasks accurately and in a timely fashion, which may ultimately affect the efficiency of the response. This is especially true in disaster situations when time is critical, and resources are already limited. Thus, there exists the need for long-term and continuous investment in preparedness activities to enhance an organization's state of readiness.

WHAT DOES PREPAREDNESS MEAN FOR CASH AND VOUCHER ASSISTANCE?

In the humanitarian context, preparedness is broadly defined as ‘the knowledge and capacities developed by governments, response and recovery organizations, communities and individuals to effectively anticipate, respond to and recover from the impacts of likely, imminent or current disasters’ (UNDRR, 2009). Preparedness is one of the main phases of disaster management and includes five major areas which should be continuously developed (Tomasini and Van Wassenhove, 2009):

- i.** human resources,
- ii.** knowledge management,
- iii.** logistics,
- iv.** financial resources,
- v.** and community.

Investment in preparedness activities that fall under these five areas can positively impact responsiveness during a disaster and may reduce the overall cost of the response. In research related to preparedness activities, the development of physical resources (eg, inventory, infrastructure, technology) often receives more focus than intangible resources (eg, capacity

building and training) (Kunz et al., 2014). However, the proper transfer of knowledge and skills, especially at the local level, is imperative for the effective and timely management of disasters. In other words, responsiveness depends upon contingency planning and ensuring the right systems and tools are in place when and where an emergency occurs.

For CVA, the concept of preparedness differs slightly. Although it still relates to all the five major areas, there are distinct elements that differentiate it from other forms of assistance. This means that if organizations wish to provide CVA alongside in-kind aid, additional resources, knowledge, and logistical considerations are needed. For instance, disaster preparedness plans may emphasize the pre-positioning of supplies and optimal transportation, whereas CVA preparedness activities are more concerned with identifying financial suppliers, mapping potential cash distribution points in a specific geographic region, and conducting market assessments. In this manner, while similarities exist between preparedness measures using in-kind distribution, local procurement, and CVA, there are important differences that must be recognized for aid to be delivered effectively.

Unfortunately, literature related to preparedness for CVA is fragmented and limited (Maghsoudi et al., 2021), despite calls to expand the body of evidence (Spencer et al., 2016). This has led to multiple interpretations of what ‘CVA preparedness’ entails. Of the two most common interpretations, one considers ‘CVA preparedness’ to be the minimum requirements necessary to implement and operate CVA programmes (IFRC, 2021), whereas the other interpretation refers to the inclusion of CVA in disaster preparedness and contingency plans so that cash may always be considered alongside other forms of relief (UNHCR, 2016; WFP, 2021). The first interpretation can be applied to both disaster relief and development aid, but the second is directed towards emergency response. By integrating both definitions, a third interpretation emerges: if humanitarian organizations choose to institutionalize CVA into their response plans, then they must understand what activities need to be carried out, who is responsible for each activity, what the minimum skill requirements are to carry out each activity, and the capacities needed to scale up in times of a disaster.

At present, no standardized minimum requirements exist across the humanitarian sector for short-term operability and long-term integration of CVA. This is partly because there are no recognized standard operating procedures across the humanitarian community for using CVA. Initiatives have been made, including the integration of CVA as a core modality into the Sphere Handbook and the development of the Minimum Standard for Market Analysis (MISMA). These handbooks are designed to ensure quality and accountability during humanitarian responses through a consistent and principled approach. Additionally, the Tracking Cash and Voucher Assistance (CVA) Working Group, part of the Grand Bargain Cash Workstream, has undertaken the challenge of finding a systematic approach to better track and trace global

volumes of CVA. Despite the progress being made, there is still no benchmark to determine whether an organization is ‘cash-ready’ prior to implementation or not. A lack of preparedness and operational knowledge can lead to reduced cost-efficiency and effectiveness of the programme. Well-designed projects may utilize more resources initially, but often reduce long-term logistics and supply-related costs. Therefore, investment in capacities and capabilities is necessary to execute each individual step, which can improve the overall state of preparedness for CVA programming. The next section provides an overview of the steps in the cash and voucher assistance operations cycle, along with a framework for building capacities and capabilities.

PREPAREDNESS THROUGHOUT THE CASH AND VOUCHER ASSISTANCE OPERATIONS CYCLE

Even though no single set of standard operating procedures exists across the entire humanitarian sector for using CVA, there are specific activities that must be completed to adequately evaluate, implement, and manage cash projects. The cycle in Figure 3 presents the high-level phases necessary for cash and voucher assistance programming, based on the steps outlined by the CALP Network. The CALP Network is a diverse group of more than 90 members, including donors (eg, USAID, SIDA SDC), UN agencies (eg, WFP, UNHCR, UNICEF), and NGOs (eg, IFRC, Oxfam, and Care International), who collectively provide the majority of all humanitarian CVA delivered globally. Their aim is to enhance the skills, knowledge, and policy of CVA, both within and between organizations in the humanitarian ecosystem. Thus, the cycle shown in the figure represents a general consensus of the major steps involved in CVA programming, though each individual organization’s process may vary to meet its specific objectives and mandates.

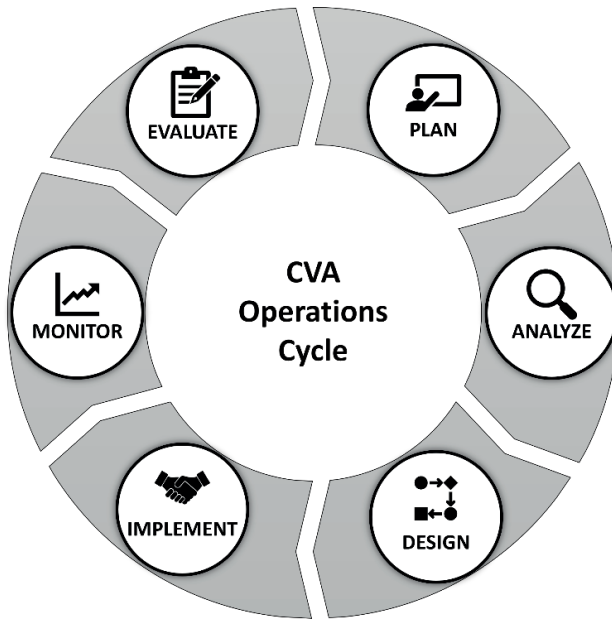


Figure 3. CVA Operational Cycle

In the planning phase, the primary objective is to create a basis for the CVA project and develop a flexible strategy to implement and operate the programme, both in the current state and in potential crisis situations. During the analysis phase, assessments are conducted to ensure that CVA is feasible, addressing the adequacy of the local infrastructure, market functionality, security risks, access to financial services, and supply chain constraints. Once the operational context has been assessed, the different options for delivering CVA can be explored in the design phase. This step involves establishing contact with financial and payment service providers, vendors, suppliers and conducting procurement activities to determine which delivery mechanisms are feasible and implementable at scale.

When the design phase has been carried out and an action plan is in place, implementation can begin. Contracts and standard operating procedures must be established with suppliers, partners, and other relevant actors involved in the distribution, monitoring, and reconciliation of CVA. Once the programme has been set up, periodic monitoring of the distribution cycles, market prices, inflation, and contract ceilings must be conducted throughout the project so that adjustments can be made as needed. When the project is completed or terminated, a thorough evaluation should be made to retain lessons learned, improve institutional knowledge, and keep records to have a thorough audit trail.

Annex 1 provides a more detailed list of activities to be performed at each phase of the operational cycle. The activities listed for each phase are derived from operational procedures and toolkits for CVA from leading humanitarian agencies such as RCRCM, UNHCR, WFP,

UNICEF, as well as consortiums of NGOs, such as the Collaborative Cash Delivery Network, the Cash Learning Partnership Network, and EMMA Partners. It must be noted that each activity consists of its own set of steps and sub-activities which vary between organizations. The organizations and consortiums listed provide valuable guidance for each of these activities. Thus, the set of activities may be revised according to each organization's needs, operating procedures, and objectives. The initial list shown in Annex 1 has been compiled to provide a starting point based on common approaches.

Capacities, Capabilities, and Competencies

The activities to be completed for each phase require knowledge of finance, supply chain, security, and information technology. According to Maghsoudi et al. (2021), this requires a capable workforce and available resources for each task. By developing capabilities (ie, skills and knowledge) and investing in capacities (ie, human capital, allocated budget, time, and assets), an organization increases its ability to perform certain tasks. The level of performance for each task is dependent upon how competent the organization is, thus there is a need to continually develop capabilities and build capacities to ensure successful implementation and operation.

This follows what is known as 'the resource-based view' (Barney, 1991), in which an organization must know what its competencies and capabilities are before it can fully utilize its own capacities. Inversely, investing in the development of knowledge, skills, and tools increases capacity, which impacts an organization's capabilities. Figure 4 presents a framework adapted from Javidan (1998) and Zoiopoulos et al. (2008) which represents the hierarchical relationship between capacities, capabilities, and competencies. From this perspective, an organization works from the inside out by inventorying its own resources, identifying its abilities, and recognizing strengths that can be leveraged to its advantage to respond to the needs of the external environment (Prahalad and Hamel, 1990). Applying this concept to the humanitarian sector, organizations that understand their own competencies can develop responses based on their known strengths and weaknesses.

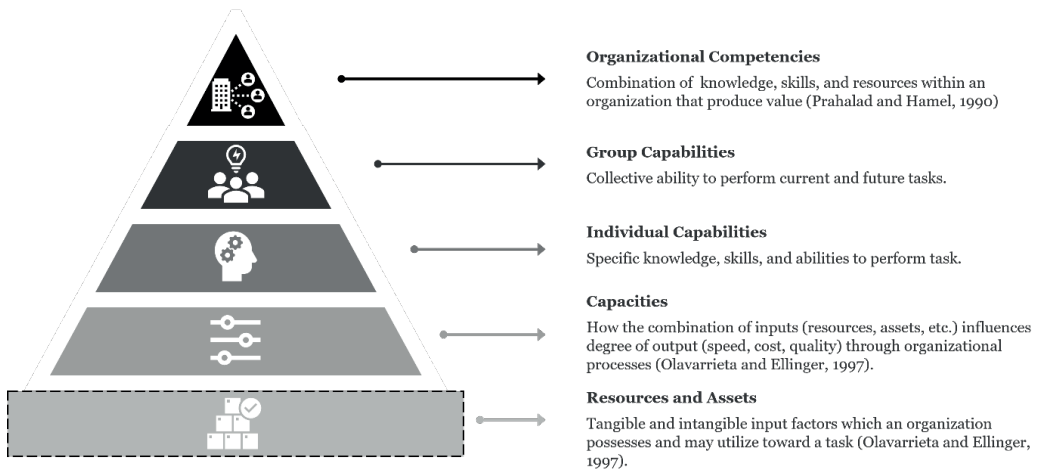


Figure 4. Hierarchy of capacities, capabilities, and competencies in an organization; adapted from Javidan (1998) and Zoiopoulos et al. (2008)

An organization's capacity is made up of a pool of both tangible and intangible resources and assets available for utilization toward any specific task (Sanchez et al., 1996). The number of resources dedicated to a task will influence the outcome. In CVA programmes, outcomes must be measured to gauge performance related to time, cost, and quality. While it is essential that organizations track performance, there are inherent challenges in quantifying data that has both tangible and intangible dimensions. For instance, one key metric used by leading donors is cost-efficiency, which compares a project's input costs related to the outputs achieved. While tangible resources such as money, time, and assets are relatively static and measurable, other resources related such as human capital are dynamic and can only be partially measured. In measuring human capital, quantifiable elements such as the number of employees assigned to the task, including their salary and billable hours to the project can be tracked, while intangible elements related to each individual's ability to complete a task cannot be objectively calculated. As an individual's knowledge and skills increase, so does the organization's overall ability to perform tasks more efficiently, including complex or unanticipated tasks (Heaslip et al., 2019). In this sense, continual investment in skills and training should be viewed as a form of preparedness, as it affects a humanitarian organization's available capacity, which in turn may affect metrics such as performance and funding.

Developing skills for CVA, however, is not an easy task and requires an investment of resources. In addition to general knowledge related to a task or activity, the humanitarian sector requires a set of context-specific skills to operate in dynamic environments (Kovács et al., 2012). This creates a paradoxical challenge for decision-makers in humanitarian organizations; in a resource-constrained environment, how can a manager balance allocating time and money to training when it may reduce the time and money available toward relief

operations? At the same time, investment in training has a long-term effect which has a positive impact on the efficiency of relief provided (Gonçalves, 2011). This challenge has been especially prevalent for humanitarian organizations beginning to use CVA, as well as those seeking to expand existing cash programmes. In a survey conducted by the CALP Network (2019), humanitarian organizations responded that one of the biggest challenges faced in CVA programming was the risk of sacrificing quality, timeliness, or appropriateness when scaling up coverage. As CVA is a cross-sectoral tool that requires skills and knowledge from sectors such as finance, supply chain, security, and information technology, additional training and close collaboration are often required so that a team can capably perform the tasks required by the project.

To address this challenge, several leading humanitarian organizations have begun to ‘institutionalize’ CVA into their relief operations, adopting strategies to regularly consider CVA in their responses and contingency plans (Jodar et al., 2020). This strategic vision is a phased approach that requires comprehensive planning and continuous investment in capacities and capabilities, which may take place over several years to develop competencies for delivering cash. According to Stephenson’s (1998) theory of developing capabilities through learning in dynamic environments, individuals and organizations will become more capable of performing certain tasks over time, even in unfamiliar environments or against new challenges (Figure 5). Such are the conditions immediately following a disaster. By institutionalizing CVA, humanitarian agencies are fostering an environment of continuous development of capabilities and competencies, which influence their ability to respond to disasters.

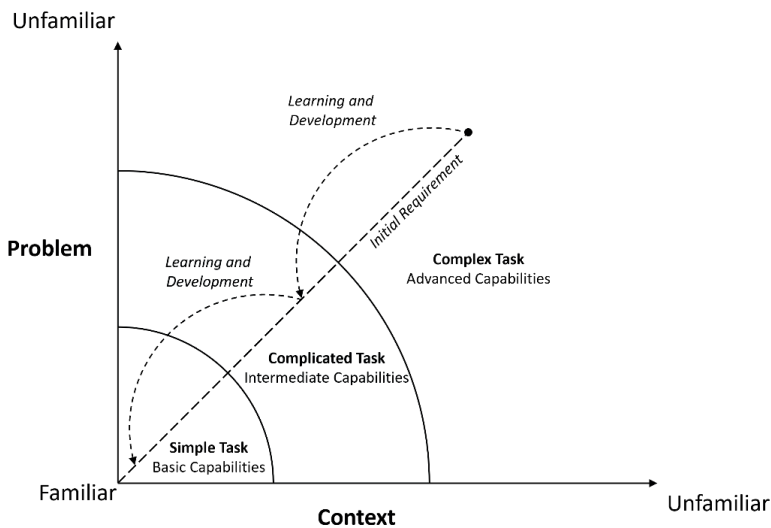


Figure 5. Complex task competency framework with learning feedback loops; adapted from Stephenson (1998) and Stacey (1996)

As shown in Figure 5, the more familiar an operator or team is with the context and problem, the simpler the task is perceived to be. More complicated tasks often require refined skills and knowledge to carry out. When a task is considered ‘complex’, a novel approach must be taken as no known solution yet exists. In complex crises, external factors such as the integrity of infrastructure and political stability are often beyond the control of any single organization, meaning that humanitarian organizations must adapt their strategies for the operational context (Harpring et al., 2021). This level of difficulty requires competency in the area to develop a new solution or approach. However, this creates a state of learning and development as information is gathered about a problem, then an action is performed, followed by a result being produced, which then creates a feedback loop by providing additional information about the original problem, thus developing competence. Over time, as experience is gained and the context becomes more familiar, an organization can perform a task more capably. The feedback loop continues to be present even after an organization becomes competent at performing a task, as the organization will constantly review and evaluate the performed tasks, creating a continuous state of development (Black, 2015).

Mapping an organization’s baseline capacities and capabilities then is the first step in being able to know which areas need development. The following tables provide a basic assessment template for documenting capacities and capabilities at the individual level (Table 2) and team level (Table 3). The information gathered from these tables should then be used to complete the operational assessment (Annex 1). This assessment is designed to help organizations understand their level of preparedness at each stage of the operations cycle.

Table 2. Individual-level CVA capacity and capability assessment

			Individual Capacities		Individual Capabilities	
Phase	Activity	My Tasks for this Activity Include:	I have the adequate resources available to carry out this task	If no, what additional resources do I need to carry out the task?	I have the adequate skills and knowledge to carry out this task	If no, what additional skills and knowledge do I need to carry out the task?
Analyze	Financial Service Provider Mapping					

Table 3. Team-level CVA capacity and capability assessment

				Team Capacities		Team Capabilities	
Phase	Activity	Our Team's Tasks for this Activity Include:	Which team member(s) will carry out this task?	Do we have the adequate resources available to carry out this task?	If no, what additional resources do we need to carry out the task?	Do we have the adequate skills and knowledge to carry out this task?	If no, what additional skills and knowledge do we need to carry out the task?
Analyze	Financial Service Provider Mapping						

Working from the bottom up, all individual operators should provide feedback for the tasks they are assigned to. Then, the same exercise can be conducted at the team level, as tasks may be shared or tightly coupled with other tasks. At the operational level (Annex 1), the assessment gives insights into the level of support available from the organization and whether activities can be executed in the current state. Identifying deficiencies in capabilities and inadequate capacities can help an organization know which areas need additional investment, both at the individual level and group level. The completed assessment provides a snapshot of an organization's current state of preparedness to conduct CVA activities, and may also provide insights toward performance in a potential disaster situation. As exemplified in Figure 5, the results of the assessment may shift over time depending on the degree of familiarity with the problem. Therefore, the assessment may need to be updated periodically to provide relevant results.

Beyond the organizational level, intra-organizational networks may enable higher performance through information sharing and knowledge access. The ability to share information effectively amid an ongoing disaster is a dynamic capability, which can significantly impact the speed and efficiency of relief operations (Suifan et al., 2020). Particularly, the concept of solidarity networks applies to the humanitarian sector, which posits that organizations in the network value mutual interest over self-interest without focusing on the return of capital (Smith, 2009). In these network formations, organizations form a collective entity to coordinate their efforts under a set of common guiding principles. The humanitarian cluster system is an example of such a network, which can improve information diffusion across the entire network of actors (Altay and Pal, 2014).

This concept has expanded to include cash operations as well, leading to the formation of the Global Cash Working Group, which acts as a focal point for the humanitarian community. Information is gathered from field operations, which then help formulate good practices that can be disseminated to national, regional, and local working groups. In this way, smaller organizations with limited capacities and capabilities can leverage information provided by partner organizations. Other initiatives in the humanitarian community are also underway to address the need for more effective coordination mechanisms in CVA operations, including the UN Common Cash Statement for UN agencies and the Cash Coordination Caucus to adopt system-wide approaches to CVA. Both initiatives share the same objective: to ensure accountability and predictability of CVA programming within the humanitarian ecosystem. These initiatives not only aim to enable continuity of operations against limited resources but also to allow inexperienced organizations to gain knowledge from more experienced partners. This is exemplified through a case study of the cash working group in Mexico in the following section.

CASE STUDY: PREPARING FOR CASH ASSISTANCE IN MEXICO

During the COVID-19 outbreak, many organizations sought to expand their use of CVA to help overcome procurement issues caused by global supply disruptions of personal protective equipment and hygiene items. However, the organizations faced several challenges as they scaled up existing CVA programmes or implemented new projects, largely due to constraints related to organizational capacities and capabilities. To address these challenges amid the crisis, five humanitarian organizations with varying degrees of experience formed a cash working group (CWG), which is analysed in this case study.

This case primarily focuses on the planning, analysis, and design phases for CVA through a joint procurement exercise. Procurement of financial services for beneficiaries can be a challenging task that requires knowledge of finance, logistics, and local laws, customs, and regulations. The process results in the establishment of a contract or legal framework agreement with a financial service provider (FSP) or payment service provider (PSP) for the distribution of cash or vouchers to beneficiaries using bank accounts, debit cards, mobile money, etc. Following the procurement phase, organizations must be able to conduct monitoring and evaluation activities throughout the CVA project cycle, adjusting distributions when necessary to maintain effectiveness. These tasks generally require more advanced skills and knowledge of CVA programming, which creates barriers for smaller or less experienced organizations.

A note on methodology

To understand how members of the CWG overcame the challenges related to capacity and capability constraints, semi-structured interviews were conducted with nine participants representing all five organizations of the CWG, as shown in Table 4 below. Secondary data, such as external reports, meeting minutes, studies, and publications, were used for contextualization and triangulation of information (Seuring, 2008). In collecting and storing the data, a strict protocol was followed to ensure the privacy of the organizations and participants involved. To protect the identities of the interviewees and the integrity of the research, the names and organizations have been anonymized.

Table 4. Cash Working Group members and interviews conducted

<i>Cash Working Group Member</i>	<i>Dedicated CVA Staff?</i>	<i>Years Using CVA in Mexico*</i>	<i>Interviews Conducted</i>
IHO 1	<i>No</i>	3	1
IHO 2	<i>Yes</i>	5	4
IHO 3	<i>Yes</i>	2	1
IHO 4	<i>No</i>	0	2
IHO 5	<i>No</i>	0	1

The data gathered from each interview was recorded and transcribed using Nvivo software, and later reviewed and cleansed. During the analysis, key insights emerged in two ways: within each organization and between organizations. When complemented with the hierarchy presented in Figure 4 and the framework in Figure 5, the data presents a story of how each organization contributed their individual capabilities and capacities in the formation of a new group, which transcended typical organizational level boundaries.

Contextual Background

Mexico has a history of providing cash assistance to its citizens to improve livelihoods, education, and healthcare access. In 1997, the government of Mexico founded a social assistance programme, *Progresa* (rebranded as *Oportunidades* in 2002, and later as *Prospera* in 2014), which used conditional cash transfers to counter the effects of the economic crisis from 1994 to 1995. The programme sought to alleviate poverty by providing financial assistance to families below the food poverty line to cover the costs of healthcare, education, and nutrition. By the end of 2015, the programme had provided support to over 25% of Mexico's population and created both short-term and long-term impacts on school enrolment rates and children's nutritional intake (Masino and Niño-Zarazúa, 2020). The programme acted as a model for national social protection and was replicated in 52 other countries.

Nevertheless, this social protection programme was not designed as a response option for disasters or humanitarian crises, nor could the registries of beneficiaries always be used to identify populations vulnerable to natural hazards. Since 2014, Mexico has been at the forefront of an influx of immigrants fleeing from violence and poverty in the Northern Triangle of Central America (Guatemala, Honduras, and El Salvador). From 2014 to 2020, the number of asylum seekers and refugees fleeing those countries increased by over 1,400% from 66,588 to 1,030,898 (UNHCR, 2021). Many of these migrants were women and unaccompanied minors seeking refuge in Mexico, the United States, and Canada.

Although refugees have the right to permanent residence in Mexico, they have been largely excluded from *Prospera* due to issues regarding documentation and targeting. UN agencies

sought to close this gap and began operating more closely with the Mexican Commission for Refugee Assistance (COMAR) and the National Migration Institute (INM). These partnerships enabled more robust support to be provided to asylum seekers and refugees, including determination of status and temporary cash and voucher assistance. The objective was to create a transitory pathway for refugees and migrants into Mexico's social safety net system. Although much of the preparatory work had to be redone and redesigned to meet the needs of the refugees and asylum seekers, the success of *Progresa/Oportunidades/Prospera* did have an indirect impact on subsequent CVA provided by humanitarian organizations in Mexico. Most notably, banking infrastructure had expanded and grown throughout the country to include additional rural locations which had not previously had access to formal financial services. Humanitarian organizations were able to utilize the matured national financial network in the planning, implementation, and management of their own CVA programmes.

Joint Initiatives for Preparedness

As more humanitarian organizations began to use CVA throughout the country, the need arose to better track *who does what, where, and when* (4W) to avoid duplication of aid and to ensure no gaps exist in coverage. In early 2020, shortly before the onset of the pandemic, the CWG in Mexico was formed to improve collaboration and communication among agencies that use CVA. As the group became operational, the COVID-19 pandemic arrived and brought about several new sets of challenges.

Mexico was hit particularly hard during the first year of the pandemic. Over 1.4 million cases and 123,845 deaths (WHO, 2020) were confirmed by the end of 2020, which was the third-highest mortality rate in the world at the time. Humanitarian organizations recognized that vulnerable migrant and refugee populations in rural, urban, and camp settings which were not included under social protection programmes, like *Prospera*, were at a greater risk than other groups. The humanitarian organizations worked quickly to procure personal protective equipment and hygiene items, but faced shortages and severe delays due to global supply chain issues. Rather than compete with the commercial sector for items, organizations adapted their strategies to rely on cash assistance and in-kind to meet the additional needs. However, not all organizations had the capacities and capabilities in place to readily scale up their CVA programmes.

During the initial onset of the pandemic, the CWG's activities slowed down as inter-organizational duties were prioritized over intra-organizational matters. Although all five organizations had begun institutionalizing CVA at the organizational level, only three had conducted in-country CVA activities prior to the pandemic. Even for those three organizations, CVA was still a relatively new concept for their team in Mexico. In carrying out the tasks, only two of the five organizations had dedicated CVA positions, while the other three organizations

integrated CVA-related tasks into an existing function. This presented an acute capacity constraint during the pandemic, especially for the three organizations with cross-sectoral functions. Even the two more experienced organizations noted the lack of capacity caused delays in the distribution of aid, especially during the period of the pandemic when it was unclear in which ways the virus could be transmitted. One organization reported that they considered the possibility of temporarily providing only aid through digital cash transfers to reduce the risk of spreading the virus to beneficiaries – but realized it would not be feasible to do so in a short timeframe.

The pandemic pressed the members of the CWG to evaluate how to strengthen their individual in-country operations. Three of the five members had existing CVA operations, but all mentioned that they would be needing to establish a new contract with an FSP or PSP in the next year or two. Therefore, the members agreed to initiate a joint procurement exercise. The task would be led by the member of the CWG with the most experience in CVA, but all members would contribute to the tasks.

One of the first objectives was to create a database of nationwide FSPs and PSPs operating in Mexico. Each organization contributed to the database by sharing information related to past experiences with FSPs and PSPs. This included the services and delivery mechanisms offered by each FSP/PSP, their network of operation, fixed and variable costs, transfer time, and prerequisites, such as ‘know-your-customer’ (KYC) requirements. Similar to an organization’s internal baseline assessment in the planning phase, the compilation of this database acted as an intra-organizational exercise to document the group’s shared resources. Contact information for each organization was provided where possible, to allow each member of the working group to reach out to any FSP/PSP in the database.

To build upon this database, an extensive FSP/PSP mapping exercise was conducted to identify additional financial institutions with nationwide coverage. As the members of the CWG operated in different Mexican states, FSPs/PSPs with national presence were targeted first as they could mutually benefit all organizations. Once a list of organizations had been generated, an Expression of Interest was launched targeting those FSPs/PSPs with nationwide coverage to gather more information. The response rate remained low as several of the FSPs mentioned that they did not have the capacity to take on additional projects during the pandemic. If the organization did respond, a meeting was set up to orientate the FSPs/PSPs with CVA and inform them of the upcoming joint tender. In these meetings, the FSPs/PSPs also advised the CWG of their requirements (eg, KYC) and possible delivery mechanisms. Regardless of their interest, each FSP/PSP identified in the exercise was recorded in the database for future reference.

As the database was expanding, the CWG also began activities in the design phase by developing a charter document for the group. This initial document described information about the group as a whole, including its purpose, scope, and structure, as well as descriptions of each individual member, including, the background of the organization, goals, and populations they worked with. Not only did this exercise help the group to form a common goal, but also saved time during the tendering phase, as this information was used to help shape the solicitation documents (e.g. the *terms of reference*).

Procurement

With the information gathered from the FSP/PSP meetings, and the initial charter established, the tender documents could start to be assembled. Four key documents needed contributions and agreement from all parties before the tender could be launched:

- i. Terms of Reference,
- ii. Technical Requirements and Offer Form,
- iii. Financial Offer Form,
- iv. Data Protection Policy.

Creating, editing, and finalizing these documents was a rigorous task as each organization of the CWG needed approvals and reviews from other departments within their organizations (eg, finance, legal, and programme). Other documents, such as the general terms and conditions of the contract and code of conduct, aligned with the leading organization's principles – but were accepted by all members of the CWG.

The technical requirements and financial offer form would provide the CWG with the necessary information for awarding a contract, thus those documents particularly needed to be representative of each individual organization and the group as a whole. To allow the procurement activity to serve all organizations equally, bidders were requested to denote their available delivery mechanisms as well as areas of operation. While preference was given to nationwide operators, this also increased competition in the tendering process by allowing bidders with only regional or local coverage, despite the desire for nationwide coverage.

The solicitation process resulted in the leading organization of the CWG establishing a contract with the FSP which offered the best value for money and nationwide coverage for CVA. The winning bidder was also the most flexible service provider, by offering cash or voucher packages, with physical and digital means for both. Each of the members of the CWG could either 'piggyback' onto the established contract or establish their own contract with the winning bidder, or another bidder, depending on their procurement rules and individual programming needs.

LESSONS LEARNED AND FUTURE ACTIVITIES

Following the closure of the joint procurement activity, the CWG held a meeting to discuss lessons learned and plan for the next steps. Two of the group members' organizations commented that they gained significant knowledge during the procurement process and would be able to adopt a more assertive role in the next procurement process. The lead organization also commented that through the CWG, more FSPs were able to be identified on the market, leading to a contract with one which offered the best value for money. All members agreed that they were able to achieve a greater outcome through this collaboration, as opposed to conducting the process individually, especially considering the strain caused by the pandemic.

Moving forward, the group addressed future activities related to implementation, monitoring, and evaluation phases. Even though the individual members worked in different contexts and with different populations of interest, they agreed that sharing information for monitoring and evaluation activities could reduce redundant work and increase efficiency at the network level. For instance, one member advertised that they were conducting financial literacy training through an NGO and would be willing to share their findings and information if other members were interested. Another member said they were re-evaluating their CVA exit strategies and would be willing to receive input from other members. The information exchange continued and created a snowball-like effect which resulted in the creation of a 'good practices' document to record how CWG members carried out CVA activities and the challenges experienced. The document would act as a reference guide that would be continuously updated by the group based on their learnings. This would also provide orientation and a useful tool for future organizations that were interested in joining the group.

In addition to bringing other organizations into the CWG, the members also discussed how they could link their information to the government of Mexico's various social safety net programmes, such as *Prospera*, to ensure sustainable social protection. For the group, their CVA programme needed to have thorough exit strategies so that the vulnerable populations would remain covered as they transitioned into society, or otherwise changed situations. This common protection aspect adheres to UN Sustainable Development Goal #17 (*Partnerships for the Goals*) and further strengthens the link between humanitarian relief aid and development work.

The creation of the CWG enhanced the level of preparedness for all members. It provided an opportunity for each member to develop their capabilities and share resources, which created a larger capacity than any one single organization possessed. Thus, the group as a whole was able to perform higher-level tasks, saving time and resources across all organizations.

SUMMARY AND FUTURE DEVELOPMENTS

Cash and voucher assistance is becoming an increasingly vital component of humanitarian aid, with organizations expanding their operations and piloting projects in new contexts. As interest continues to grow, the demand for skilled CVA operators will also grow. The sector currently faces a shortage of experts, largely due to the specialized training needed to manage programmes. Consortiums of NGOs and working groups have been working to build the global capacity for CVA programming to address this problem. For instance, the CALP Network has begun piloting the Building Individual Expertise Programme, to enhance CVA knowledge at the individual level, so that personnel may then join a humanitarian organization with qualifying skills. This too will take time to build a developed workforce in various regions though. Against this constraint, organizations must be willing to also invest time and resources to develop the necessary skills and knowledge within their organization to deliver cash and vouchers effectively. Utilizing extant CVA toolkits and conducting assessments, such as the ones provided in this chapter, are good practices to help identify which areas should be invested in and how resources can be allocated.

Preparedness for CVA not only means having contingency plans built into an organization's framework but also ensuring that the organization has the means to carry out the plans. Despite the evidence linking collaboration and information sharing to preparedness, organizations still often operate in silos, focusing on their own mandates and objectives. Though, this is because of an unwillingness to form partnerships, but rather due to the fact that the formation of working groups and coordination of CVA activities is still done on an ad hoc basis. Initiatives at the global level are underway, such as the UN Common Cash Statement for UN agencies, the Collaborative Cash Delivery Network for NGOs, and Cash Coordination Caucus, although these initiatives face several hurdles due to the lack of standardization across the sector. As changes may be slow to take effect across the sector, it remains the responsibility of each organization to actively seek out opportunities for joint initiatives in the face of shared challenges.

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Annex 1

Phase	Activity	Organizational Strategy			Capacity Assessment		Capability Assessment	
		Which team(s) will carry out this activity? Who is the focal point?	Do we have an organizational strategy or SOPs in place for this activity?	If no, how will we execute this activity (eg, adopt partner SOPs, develop SOPs, outsource activity)?	Does the assigned team have the adequate resources available to carry out this task?	If no, what additional resources do they need to carry out the task?	Does the assigned team have the adequate skills and knowledge to carry out this task?	If no, what additional skills and knowledge do they need to carry out the task?
Plan	Internal Capacity Assessment							
	Contingency Plan							
	Baseline Assessment							
	Engage Donors and Stakeholders							
	Needs Assessment							
Analyze	Targeting Plan							
	Project Action Plan							
	Feasibility Assessment							
	Contextual Assessment							
	Market Assessment							
Design	Financial Service Provider Mapping and Assessment							
	Security Assessment							
	Delivery Mechanism Feasibility Assessment							
	Establish or Refine Standard Operating Procedures							
	Develop Risk Mitigation Strategy							
Implement	Procurement of Financial Services							
	Develop Exit Strategy							
	Establish Contracts							
	Establish Troubleshooting Mechanisms for Beneficiaries							
	Begin Distribution							
Monitor	Financial Monitoring							
	Market Monitoring							
	Security Monitoring							
Evaluate	Lesson Learned							
	Reporting							

Russell Harpring

Cash and Voucher Assistance in Humanitarian Contexts: Supply Chain Determinants for Feasibility and Operability

Over the past two decades, the humanitarian sector has witnessed a significant expansion in the use of cash and voucher assistance to persons affected by disasters. Cash and voucher assistance offers flexibility and dignity of choice for recipients, but depends on functioning supply chains to support the market interventions. In humanitarian crises, supply chains are vulnerable to disruptions, impacting the feasibility and operability of cash and voucher assistance. While extant research has demonstrated that cash and vouchers can be efficient and effective response options when feasible, it has not addressed the antecedents and underlying supply chain structures that enable cash programming. This thesis explores how humanitarian supply networks and relief chains enable cash and voucher assistance to be efficient and effective as a response modality across different contexts.

In this thesis, three studies were conducted from a systems perspective to provide a holistic perspective of the humanitarian aid system. Each study included specific research objectives to generate findings directed to the overall aim of the thesis. The first study is a systematic literature review investigating the theoretical relationships between supply chains and cash and voucher assistance in humanitarian contexts, exploring context-specific factors that influence which modes of aid are viable, feasible, and efficient. The second study builds upon the findings of the first article and investigates how humanitar-

ian organizations adapt their delivery strategy to cope with environmental factors and contextual uncertainties through a case study using system dynamics. Following this, the third study uses a case study to explore how humanitarian organizations can increase their response flexibility for cash and voucher assistance programmes by investing in preparedness measures.

This thesis puts forth contributions to theory and practice related to the management of humanitarian supply chains and cash and voucher assistance operations. For humanitarian organizations, this thesis offers insights into how cash and voucher assistance is impacted by underlying supply chain structures and systems, which themselves are impacted by actors and the external environment. These factors affect the initial feasibility of cash and voucher assistance as well as how it is operated and managed throughout the operations cycle, identifying ex-ante and ex-post determinants. Theoretically, the work contributes to an understanding of cash and voucher assistance as a part of the humanitarian aid system as well as the effects of organizational capabilities and capacities on humanitarian supply networks. It builds upon previous research to provide a more comprehensive understanding of how supply chains enable the use of cash and voucher assistance by addressing the interrelationships between system entities, how they influence processes, and ultimately how they create different combinational outputs.

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