



# Ambidextrous humanitarian organizations

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## Abstract

The COVID-19 pandemic disrupted life as usual around the globe. Efforts to control the spread of the virus with lockdowns and border closures pushed millions of people into food and social insecurity. Most research on humanitarian organizations have been dominated by the uncertainty and urgency of disaster response operations. However, some humanitarian organizations also operate in long-term continuous aid programs where efficiency is the key goal. We analyzed the operations of food banks in the Feeding America network and The Salvation Army USA, and found them to be ambidextrous organizations. The ambidextrous humanitarian organizations like food banks and Salvation Army, focus on long-term continuous aid programs, specifically pertaining to the sustenance of the communities they serve, but also play a key part as first responders or as local agencies aiding in disaster relief and response. We propose a framework to analyze disaster, development, and sustenance aid supply chains, and identify future research opportunities.

**Keywords** Humanitarian · Food bank · Ambidexterity · Pandemic

## 1 Introduction

The COVID-19 pandemic presented unprecedented problems to the operational research community, from supply chain disruptions to socioeconomic issues to vaccine supply chains. It forced supply chain disruption management scholars to step outside of their comfort zones as the pandemic introduced new challenges (Ivanov, 2020, Moritz, 2020). The pandemic not only tested global supply chains but also challenged the operations of humanitarian supply chains (Flynn et al., 2021). Kovács and Falagara Sigala (2021) argue that commercial supply chains have not been able to respond to the disruptions created by the COVID-19 pandemic because they primarily focus on cost minimization and implement lean processes. They argue that pandemic response supply chains and managing disruptions caused by the pandemic share many characteristics with humanitarian supply chains and disaster response.

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Humanitarian supply chain management involves the operations of disaster response and development aid (Oloruntoba et al., 2019). There is evidence that shows that large humanitarian organizations who are involved in both operations try to integrate these supply chains to save costs (Jahre et al., 2016). However, some humanitarian organizations (e.g. food banks) have built capabilities that allow them to switch back and forth between emergency response and long-term sustenance operations. In this paper, one of our objectives is to present what we call the “ambidextrous humanitarian organization”—as this capability became critical for all organizations (commercial or humanitarian) during the pandemic.

On any given day, even without a disaster or health crisis, millions of people are in need of help because of the extreme poverty they are experiencing. Generally referred as the Base of the Pyramid, people living in extreme poverty need help with education, mobility, and access to basic infrastructures like communications, water and sanitation and banking in order to be able to improve their situation (Pal & Altay, 2019). Sadly, poverty and access to food is a common issue even in wealthy nations. According to Feeding America, the food banking network of the United States, 1 in 8 people in the US may experience food insecurity (i.e. they lack access to adequate and nutritious food) in 2021 due to the COVID-19 pandemic (Feeding America, 2021). However, providing food to people to sustain their daily lives is not really “development” as the food banks are not necessarily attacking the root causes of neither poverty nor inaccessibility of food. They help people to endure the situation they are in until their situation changes. Here lies the second objective of our paper, which is to introduce “sustenance aid” as a third type of humanitarian supply chain after disaster relief and development aid.

For the purposes of this paper, we consider the flow of resources and relief to people in need as Humanitarian Supply Chain (HSC). The Fritz Institute, a think-tank in San Francisco, defines humanitarian relief logistics as “the process of planning, implementing and controlling the efficient, cost-effective flow and storage of goods and materials, as well as related information, from the point of origin to the point of consumption for the purpose of alleviating the suffering of vulnerable people” (Thomas & Kopczak, 2005, p. 2). This definition parallels the commercial supply chain management concept. However, HSCs are fundamentally different than commercial supply chains in their objective (alleviate human suffering) and constraints (access to and reliability of resources) (Van Wassenhove, 2006; Oloruntoba & Gray, 2006; Holguin-Veras et al., 2012; David Swanson & Smith, 2013; Dubey & Gunasekaran, 2016). It is not difficult to see that a sudden-onset natural disaster (e.g. tornado), development aid (e.g. bringing running water or electricity to a village), and a complex emergency (e.g. a pandemic in the midst of an armed conflict) are all different in their nature and challenges they present (Whybark et al., 2010). Accordingly, what is the most appropriate supply chain design for humanitarian organizations responding to these different challenges? We answer this question by developing a new framework, that represents the various humanitarian supply chains.

Fisher (1997) was first to argue that a firm needs different supply chain designs (physically efficient or market responsive) depending on the needs and characteristics of their products (functional or innovative). This idea lends itself naturally to HSCs demanding different designs for responding to a sudden-onset disaster versus delivering food to a region suffering from a decade-long famine, or digging wells for potable water in a remote village. The existing classification schemes in the literature mostly assume that there are only two types of HSCs which are either designed to deliver disaster relief or development aid (Van Wassenhove, 2006). While disaster relief supply chains focus on speed to alleviate suffering in a temporary situation, development aid supply chains are designed to be efficient but relatively slower to improve the livelihood of people exposed to famine or poverty.

The notion of ambidexterity in the supply chain runs against Fisher's efficient versus responsive supply chain designs idea and assumes that supply chain managers are not faced with a mutually exclusive decision (Wamba et al., 2020). Kristal et al. (2010) define supply chain ambidexterity as "an organization's strategic choice to simultaneously pursue both supply chain exploitation (efficiency) and exploration (flexibility)" (p. 415). In the humanitarian supply chain literature, the notion of ambidexterity has not been fully explored (Altay et al., 2018). But certain humanitarian organizations, such as food banks, are actually designed to be agile as well as efficient. When there are no emergencies food banks work towards sustenance and they are efficient. Business as usual for them means the absence of a disaster. But when a disaster occurs nearby a food bank, they can respond quickly, indicating an agile supply chain design. The importance of this ambidexterity became highlighted with the COVID-19 pandemic. Furthermore, the pandemic also showed that commercial firms need to build ambidexterity into their supply chains to be successful or resilient. (Gu et al., 2021).

The contribution of this paper is then threefold: First, we introduce sustenance aid supply chains as a new mode of HSC. Second, we explain the concept of an ambidextrous humanitarian organization; and third we develop a framework to classify humanitarian supply chains and identify research areas and needs to shape the future of HSC research.

The remaining of the paper is organized as follows: Section 2 reviews relevant literature on humanitarian supply chains and ambidexterity. Section 3 presents the new framework we use in explaining Sustenance Aid supply chains. This is followed by the profiles of two ambidextrous humanitarian organizations, Feeding America and The Salvation Army USA. We profile these organizations, as their main day to day objective is to provide "sustenance" aid to individuals in a local community. The uncertainty in this supply chain in terms of demand and supply (donations) is not high as humanitarian networks dealing with disasters; but these organizations play a key role when a disaster or pandemic strikes in their or neighboring communities. Section 5 discusses theoretical and practical implications of our research as well as related future research directions and we conclude the paper in Sect. 6.

## 2 Literature review

### 2.1 Humanitarian supply chains

Humanitarian supply chains are generally characterized to have fundamental differences when compared to commercial supply chains. Kovács and Spens (2007) discuss several important differences between business logistics and disaster relief logistics. While business logisticians generally work with predetermined actors or partners and predictable demand, humanitarian organizations have to deal with unknown or changing actors and unpredictable demand. HSCs require the involvement of international agencies, military forces, local authorities and non-governmental organizations (NGOs) creating bureaucratic, communication and collaboration difficulties (Oppenheim et al., 2001). Routinely, political constraints and domestic or international conflicts add more complications to the situation (Voordijk, 1999; Prater et al., 2001). Often corruption and bribery add to the uncertainty of the operations (Hecht & Morici, 1993). Locating and deploying appropriate skills and expertise, and donor-induced constraints for allocating resources further inflate this complexity (Chomilier et al., 2003; Thomas & Kopczak, 2005).

Disaster relief has been the main focus of HSC management research (Kunz & Reiner, 2012). Building on the work of Kovács and Spens (2007), McLachlin, Larson and Khan (2009)

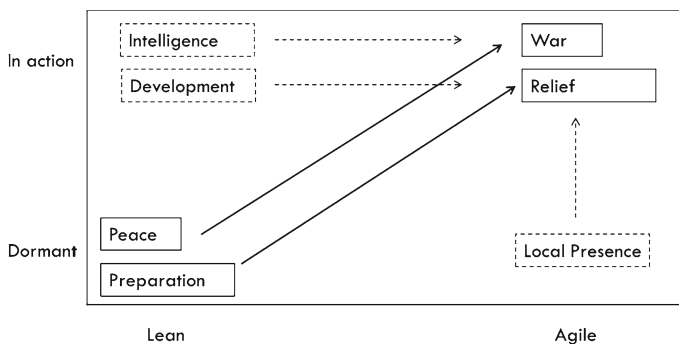
**Table 1** McLachlin et al. (2009) framework

Organisation	Environment	
	Uninterrupted	Interrupted
Commercial	Business as usual	Business at risk
Humanitarian	Development aid	Disaster relief
Military	Peace	WaPeacer

develop a framework for relief supply chains (presented in Table 1), in which differences between business and humanitarian logistics largely follow from two dimensions: motivation (for-profit vs not-for-profit) and environment (uninterrupted vs interrupted).

Disaster relief supply chains are not the only type of humanitarian supply chain. There are numerous organizations which have long-term operations around the world, like educating women and children, distributing food, or helping communities with securing clean water supply. These organizations run development aid supply chains which are slower but more cost-efficient than disaster relief supply chains. Jahre and Heigh (2008) find the dichotomy between relief and development aid supply chains to be inconclusive since aid distribution also occurs with slow-onset disasters or in regions receiving ongoing aid development aid due to reoccurring disasters. They argue that such operating environments require flexible supply chains that are designed to respond to both longer-term development aid (planned) as well as shorter-term disaster relief (ad hoc). Some large humanitarian organizations integrate parts of their emergency response and long-term development operations to take advantage of resource pools and save cost (Jahre et al., 2016).

Separately, Kovács and Tatham (2009) argue that not-for-profit organizations, such as humanitarian or military ones, operate in an environment in which the structure of their supply networks depends on the potential “active” state (e.g. disaster relief, peace-keeping missions or warfare) while they focus on process improvement during a “dormant” inactive state. Figure 1 presents their framework. These dormant and active states follow different maxims—of cost-efficiency vs. agility, yet even in the dormant state, the focus is on preparing for action. In a sense, the Kovacs and Tatham framework brings an explanation to the claim by Jahre and Heigh (2008).

**Fig. 1** Kovacs and Tatham (2009) framework

These two frameworks together present a potential but incomplete classification scheme for HSCs. For example, disaster relief is temporary and continues until the affected community gets back on its feet. Recovery operations sometimes intertwine with development aid, which is long-term and although it does not have the urgency of relief, development aid is still critical for the livelihood of the affected people. Development aid is delivered in places where disruptions are likely, i.e. environments that are likely to transition from uninterrupted to interrupted and back again. Extending the works of Jahre and Heigh (2008), and Kovacs and Tatham (2009), in this paper, we introduce a third type of humanitarian supply chain in which the focal organizations is ambidextrous.

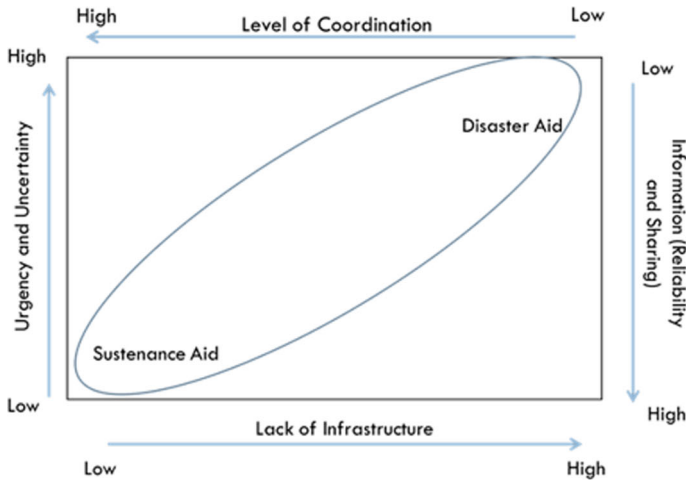
## 2.2 Ambidexterity in humanitarian organizations

Humanitarian supply chains have been previously viewed under various theoretical lenses like swift trust (Dubey et al., 2019) and dynamic capabilities (Polater, 2021). However, these views are strictly studied in the disaster domain, for example the dynamic capability view is predominantly explored in the papers that focused on the post disaster performance (Polater, 2021), while the role of swift trust and commitment theory in coordination were explored among organizations involved in disaster management in India (Dubey et al., 2019). However, humanitarian organizations like food banks, Salvation Army and blood banks operate in both emergency and non-emergency domains (Fig. 2a); while organizations like IFRC (International Federation of Red Cross and Red Crescent Societies), WFP (World Food Program) and UNICEF operate in disaster and development aid domains (Fig. 2b). As such, these organizations should possess ambidextrous capabilities to survive in these competing domains.

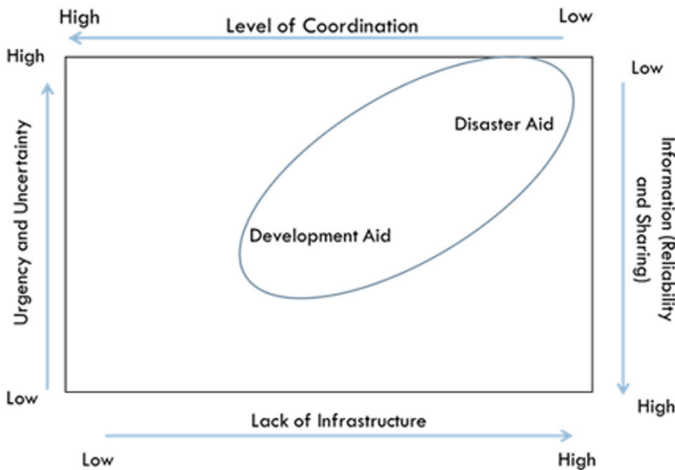
According to Kristal et al. (2010), ambidexterity in supply chain refers to the ability of a firm to simultaneously excel in many competing dimensions like cost, flexibility, delivery and quality. This contradicts the traditional view that firm's tradeoff between efficiency and flexibility (Boyer & Lewis, 2002) and need to choose the right supply chain for their product or service (Wamba et al. 2020). The notion of simultaneous pursuit of capability is generally referred to as exploitation and exploration (Kristal et al., 2010 and Wamba et al., 2020), where exploitation refers to use and refinement of existing knowledge to *efficiently* accomplish things and exploration refers to the search of new knowledge and opportunities to *flexibly* tackle novel challenges. In addition, ambidextrous organizations are shown to excel in both cost and innovation performance (Blome et al., 2013), a necessity for a modern-day supply chain. Similarly, in humanitarian supply chain—an organization should be flexible and nimble to respond during disaster and relief aid; while it should be efficient and effective during sustenance and development aid to conserve the limited supply, it receives or possess. So far, the only research that explored ambidextrous strategy in humanitarian supply chains is Altay et al. (2018), but they studied the effect of agility and resilience in disaster relief setting—not across competing domains. To the best of our knowledge, this is the first paper looking at the importance of ambidextrous strategy in humanitarian organizations operating in multiple domains simultaneously.

## 3 New framework for humanitarian supply chains

Previous work describing different types of HSCs merely focused on disaster relief and development aid supply chains (Kovacs & Spens, 2007). It makes good sense to have two



(a) Example: Foodbanks, blood banks and Salvation Army



(b) Example: IFRC, WFP and UNICEF

**Fig. 2** Domains in which ambidextrous humanitarian supply chains operate

separate supply chain structures for different needs and market conditions as explained by Fisher (1997) and presented in Fig. 3. Disaster relief supply chains generally operate in response to a disastrous event. Relief operations are designed to be temporary and end when the affected communities are back to their pre-disaster condition. During this time, the objective is saving lives and minimizing deprivation costs (Holguin-Veras et al. 2013). Due to their urgent nature relief, supply chains generally have a frantic pace and frequently suffer from coordination problems resulting in ad hoc solutions. These supply chains are designed to be agile to quickly respond to changes in demand, product mix or the operating environment (Oloruntoba & Gray, 2006). Pre-disaster activities include infrastructure design

**Fig. 3** Objectives of different humanitarian supply chains

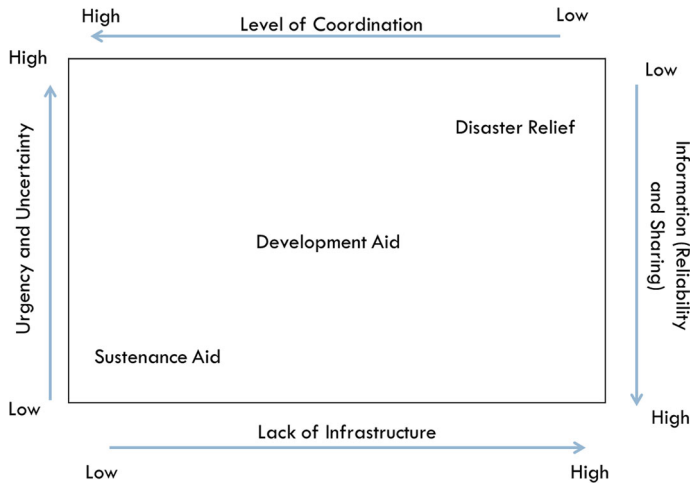
		Disaster Aid	Development Aid
Efficient Supply Chain	Efficient Supply Chain	Mismatch	Match
	Responsive Supply Chain	Match	Mismatch

and pre-positioning of relief supplies. During the response, these supply chains quickly ramp up volume and then ramp down after the relief phase ends.

Contrary to disaster relief, development aid is a response to systemic problems rather than a single event. It has a long-term focus and does not have the urgency or the uncertainty in needs yet is still critical for the livelihood of communities. The goal in development aid is the economic and social development of a region or country and therefore it can be initiated without the need of a disaster. For example, improving people’s lives by distributing efficient stoves, by providing bicycles as a form of affordable transportation, or micro-financing entrepreneurial projects in a poverty-ridden region are all considered development aid. Since development aid organizations operate in an area for a long time they tend to be more organized and coordinated. Relative to post-disaster mayhem, development aid supply chains have better and more reliable information management and exchange. However, it should be noted that development aid supply chains are in locations who are need of external aid, countries with limited resources of their own and depend on foreign donations.

3.1 Sustenance aid

Jahre and Heigh (2008) point out these two types of HSCs alone are not quiet adequate in explaining certain scenarios where there is neither development work going on nor the undergoing operation is in response to a disaster. We acknowledge the differences between disaster relief and development aid supply chains but argue that there is a third type of HSC. These HSCs share common objectives with the relief and development aid supply chains, i.e. save lives and/or improve the quality of life in a community. However, there is no urgency, no emergency or conflict in their operating environment. Many of them operate in wealthy and developed nations. There is an existing infrastructure that allows for relatively smooth information sharing and coordination. And finally, these supply chains have less uncertainty in demand and supply availability. We refer to these HSCs as Sustenance Aid Supply Chains (SASC). Sustenance Aid refers to activities like alleviating hunger and improving life, but unlike developmental aid—it is not global, but mostly local. Examples of such supply chains include Salvation Army (core mission of rehabilitation through sale of goods in Thrift stores), Goodwill, and Feeding America (food banking network of the US). These supply chains are not only evident in developed countries, but also in developing and some underdeveloped nations. For example, in India, organizations like Akshaya Patra who serve 1.4 million children from 10,770 schools across 10 states are part of sustenance aid supply chains (see akshayapatra.org).



**Fig. 4** Different types of humanitarian supply chains and their relative characteristics

With respect to their organizational structure and infrastructure, SASCs are similar to for-profit supply chains, with existing resources and plans at strategic, tactical and operational levels. SASCs have established warehouses and branches with transportation infrastructure. They generally have established procurement policies and processes. The differences lie in the not-for-profit mission, suppliers (donors) and customers (recipients). Demand and supply are fairly predictable with known trends and seasonality, and the success of the organization lies in efficiently managing them. This is in contrast to development aid, where demand overwhelms supply and the goal is to provide aid in areas with scarce resources and infrastructure (e.g. medical aid in Africa). Figure 4 demonstrates the relative differences in uncertainty, coordination, information flows, and infrastructure between the three types of HSCs and Table 2 captures some of the key characteristics of these supply chains.

## 4 Profiles of ambidextrous humanitarian organizations

We profile two ambidextrous organizations in this paper: Feeding America and its food bank network, and Salvation Army USA. Both these organizations have primary objectives grounded in sustenance aid: like domestic hunger-relief in the case of Feeding America, and helping in drug and alcohol rehabilitation, homelessness and alleviating poverty in the case of Salvation Army. However, these organizations are part of the first responders when a disaster strikes, like Houston Food bank's role during Hurricane Harvey (Morago, 2017) and Salvation Army Florida's role during Hurricane Irma (Shirley, 2017).

### 4.1 Feeding America and the food bank network in USA

Feeding America is US's largest hunger-relief organization. In 2020, it has provided over 5 Billion meals through its 200-food bank network (Feeding America Annual report, 2020). At the peak of COVID-19 pandemic, it was projected that Feeding America network served 1 in 6 Americans, on average it estimates serving 1 in 8 Americans during the non-pandemic



**Table 2.** Characteristics across the three different Humanitarian Supply Chains (HSCs)

	Disaster Aid	Development Aid	Sustenance Aid
Aid receiving Environment: Infrastructure such as roads, warehouse and logistics resources	Most likely destroyed by the disaster event—natural (flood, hurricane, earthquake) or man-made (war)	Poor infrastructure, as these would be in developing countries or regions, recovering from a disaster. Example—supply of medical and healthcare related activities in countries with improvised economy.	Very good. The environment and region would be good with no impending disaster in the near horizon, but still there could be people needing aid in terms of food, clothing and shelter.
Time of need	Immediate (in a day or two)	Not urgent, but still the need to be satisfied in a short time frame (weeks or months)	Known in advance, so planning takes place months ahead of time
Planning	High level of uncertainty—both the need and supply are not known in advance.	Fair bit of certainty around the need, however the supply could be scarce or hard to deliver.	The need and resources of supply are known in advance, and planning takes place like a commercial business.
Timeframe of operation	Short term (during recovery phase)	Long term (until the livelihood of communities is sustainable)	Perpetual (the people they serve may change, but the need in community would remain)
Information availability	Difficult, both in obtaining and disseminating the information.	Due to entity's presence in the region for long time, the information could be more reliable and information exchange platforms could be setup.	Since they operate in relatively stable economies and regions, their information reliability and sharing capabilities could be as efficient as commercial organizations.
Coordination and Collaboration	Difficult, due to the lack of infrastructure and information availability	Reasonably good, because of lack of urgency, better information availability and supply network	Established relationship with suppliers, downstream members and partner associations.

time. Feeding America secures donations from government, manufacturers, retailers, packers and growers and then sends the food to the food banks that most needs it. In almost all cases, it does not handle the storage or shipping—it is handled by the donors or the recipient food banks. The food banks then receive the donated products and supply it to the families in need through food pantries, soup kitchens, shelters and meal programs. Apart from this, Feeding America supports the member food banks with training, oversight and grants to ensure the food is stored and handled properly.<sup>1</sup>

<sup>1</sup> From Feeding America website : <https://www.feedingamerica.org/our-work/food-bank-network>.

However, it should be noted that not all food for the food bank is sourced by Feeding America. In fact, it may be less than 25% (Orgut et al., 2017; Prendergast, 2017; Capital Area Food Bank Annual Report, 2019), the rest comes from direct government donation, locally sourced donations from farmers, retailers and in-kind donors. The day-to-day planning of the local food bank is to alleviate the hunger in local areas, and they need to do it efficiently, as in most cases their demand is more than the supply they possess. Ataseven et al. (2018) succinctly points the key differences between food banks and for-profit firm that distributes food: food banks have higher upstream uncertainty in terms of variety of suppliers, items and funding; they have more resource constraints in terms of talent and infrastructure; the end customer has little to no power and finally their objective is non-profit. In the US because of the private corporations and government support, most food banks have good IT and warehouse system and are able to share their inventory level with its partners. In many instances, the authors have witnessed the soup kitchens reserving the food through web and driving by the food bank to pick up their order. The food bank's logistic infrastructure in some parts of the country is so advanced that they compete with commercial food distributors to deliver food. For example, food banks in Texas deliver USDA food to school for a fee and then use that revenue to support their local needs<sup>2</sup>. Therefore, on a regular basis the food bank managers try to solve their hunger issue by securing food and delivering it to needy family with their logistical and IT infrastructure in place.

When a disaster strikes (like hurricane, tornado, fire or earthquake), it is possible that the infrastructure of the local food bank or its local partners (e.g. soup kitchens) could be damaged. In that case, the neighboring food banks and the Feeding America play a central role in procuring the required food and delivering it to the local food bank for distribution. Sometimes regional affiliation of food banks, like Feeding Texas, may take the intermediate role of coordinating disaster management. Feeding Texas's disaster response and recovery plan lays out the role of local and neighboring food banks, along with regional network's role in coordinating with Feeding America network and government, to secure food during the disaster relief operations<sup>3</sup>. Thus, we see the Feeding America and its food bank network seamlessly move from sustenance aid to disaster relief. This ambidexterity is possible because each node of the network is responsible for their local needs, at the same time the central organization like Feeding America provides procurement support (primarily) during regular times and coordination support during disaster relief. Another important activity of Feeding America network is the training of individuals and oversight of food in the network, these are vital during disaster time, as both volunteers and food imbalances can be quickly addressed. Human capital, i.e. workforce in foodbank is key for its success and it drives all supply chain integration dimensions (Ataseven et al. 2018). In addition, Ataseven et al. (2020) find that external integration should precede internal integration and that demand integration has a larger impact on food bank performance when compared to supplier integration.

In this research, we focus on the few papers that addressed food banks in the sustenance domain. They are broadly classified into two streams: sourcing or resource allocation, and storage and delivery operations. In sourcing, the biggest problem is to assign the donations equitably to organizations in need. The seminal work in this area is by the faculty members at the University of Chicago's Booth School of Business (Prendergast, 2017). Their Choice system, an online auction system that allows food banks to order food from Feeding America network based on shares (mock dollars) is still the primary mode of equitably assigning resources among food banks in the US. Before this system, Feeding America allocated the

<sup>2</sup> <https://squaremeals.org/Programs/FoodDistributionProgramforNSLP/ContractedWarehouses.aspx>.

<sup>3</sup> <https://www.feedingtexas.org/data-and-research/disaster-relief-action-plan>.

resources through a centralized system common among not-for-profit groups, called a “wait your turn” system, where it allocated food to the food bank based on their position in the queue (Prendergast, 2017). The food bank had 4–6 hours to say “yes” or “no”, based on their decision the food is allocated to the next entity in the queue. Since Feeding America only distributed 25% of the needed food to the food bank, they have no idea regarding the other 75%. Therefore, a central allocation system led to inefficiencies. The Choice system, alleviated these inefficiencies through their online auction framework, which also included a credit system for smaller food banks along with a coordination mechanism where multiple neighboring foodbanks could bid together on the food to save on shipping cost.

Other scholarly works on resource allocation include Ahire and Pekgün (2018), Alkaabneh et al. (2021) and Larson and McLachlin (2011). Ahire and Pekgün (2018) develop an integer program model to determine the optimal number of fund-raising events in a year for a foodbank in South Carolina, with the objective of maximizing the total number of meals that could be served using the food and dollar donations. This was important, since every event required resources and the budget of the food bank is limited. Alkaabneh et al. (2021) developed a framework to optimally allocate resources of the food bank among the agencies they serve. Their work explicitly addresses the issue of fairness among the agencies, they do so by treating the food provided as bundles based on nutritional value they provided. Finally, Larson and McLachlin (2011) explain the intricacies of sourcing food at Winnipeg Harvest in Canada and call for further research in this humanitarian area.

The next group of literature deals with storage and delivery operations of a sustenance supply chains of food banks. The food received is usually processed in a warehouse of a food bank with limited space; through simulation, Mohan et al. (2013), showed how to improve efficiency without increasing warehouse footprint at a food reclamation center in Arizona. Solak et al. (2014) develop a new variant of location–routing problem that is applicable to nonprofit food distribution networks, called the stop-and-drop problem. They show the benefit of this approach through a dataset obtained from food banks in southeastern US. Martins et al. (2019) redesigned a multi-echelon food bank network in Portugal while accounting for all three dimensions of sustainability: namely, cost (economics), food waste and CO<sub>2</sub> emission (environment) and access to food in an equitable manner (social). Orgut et al. (2017) address the tactical resource allocation in the food bank network, i.e. maximizing the total amount of food distributed by food bank, while equitably serving the counties in the region. They test their approach using data from a large North Carolina food bank. Finally, food banks have limited logistical resources and they need to pick up supplies and deliver them to welfare agencies within a limited traveling time. Eisenhandler and Tzur (2019) address this problem through an innovative objective function, which not only satisfies the desired allocation but also is easy to compute and implement. They demonstrate the effectiveness of this approach by several numerical experiments on real-life datasets. It should be noted that most of these routing and logistics work are in the early stages of exploration, i.e. the capacity, supply and demand are treated as deterministic (Orgut et al., 2017), hence there is a lot of room for future research in this area by relaxing these assumptions.

## 4.2 Salvation army

Salvation Army is a worldwide evangelical Christian church, originally founded in 1865 under the name “The Christian Mission”. They changed the name to “Salvation Army” in 1878 and the name itself ignited members’ enthusiasm and imagination. They adopted military uniforms and practices, terminologies were given to aspects of worship and administration,

which gave order to their congregation. The international leader holds the rank of General. There are 50 territories and each territory has a territorial commander, the territories are then divided into divisions and each division has divisional commander. Each division then encompasses a number of corps and other Salvation Army centers. The operations of the Salvation Army are supervised by trained, commissioned officers with the ranks of lieutenant, captain, major, lieutenant colonel, colonel and commissioner. Finally, the lay members who subscribe to the doctrines of The Salvation Army are called soldiers (Narayanan, 2013a). Today, the Army has a presence in 131 countries with approximately 15,000 churches or corps. It is managed by the international headquarters in London (Salvation Army Annual report, 2020). In the US, the Salvation Army operations is divided into four territories, namely Western, Southern, Eastern and Central territory, each governed by a territorial commander (Connon, 2017). As stated earlier the territories are then divided into divisions, led by a divisional commander and then some major metro areas have an area commander. Under their command, they have several community and social service centers run by the corps (Narayanan, 2013a).

The main mission of the Army is to rehabilitate the poor, gamblers, thieves, prostitutes and drunkards and preach hope and salvation to them<sup>4</sup>. They achieve these through their community and social service centers across the world, and to run these operations they raise revenue through donations. In the US, most of these donations are in the form of used items, which are in turn sold through their network of family and Thrift stores. The revenue from Thrift stores is then used to run these rehabilitation centers. This is not a small operation, for example in the city of Dallas, Texas, the Salvation Army runs a network of 7 Thrift stores and the revenue from these stores is about 80% of their \$10 million budget in 2010 (Narayanan, 2013a). Majority of the revenue is used for local rehabilitation operations, like food, upkeep of facilities, salaries to staff members and other operational needs. The remaining amount (goal is up to 30%) is the transferred to the territorial headquarters for strategic initiatives, one of which is the disaster response (Narayanan, 2013b). Just like the food bank, the local operations in Salvation Army take care of the day to day sustenance need for rehabilitation. When a disaster strikes, the other regions of Salvation Army deputize their resources through the territorial headquarters to help the local chapter in need. For example, Salvation Army in NJ and Atlanta pitched in during Hurricane Irma by sending supplies and resources to local chapter in Florida (Anchor, 2017; Felice, 2017). The coordination, communication and logistical arrangements are carried out by the central command during these tough times. Thus, their military order comes handy when they transition from sustenance aid to disaster aid or relief.

Even though they play a vital role in sustenance and disaster aid, the research in Salvation Army operations are lacking in academic literature, even when present, they are mostly in the disaster domain (Connon, 2017). To the best of our knowledge there are only few academic research projects that explores the Salvation Army operations in sustenance domain, they are Reyes and Meade (2006), and Narayanan (2013a). Reyes and Meade (2006) present a model based on risk-pooling as a method to improve the responsiveness of redistributing donated products in the supply chains such as Salvation Army. Their simulation models reveal slightly increased inventories at locations like Thrift stores and lower lost sales, thereby increasing revenue. Narayanan (2013a) explores the operations of a Salvation Army facility in Texas and proposes ways to improve their revenue through efficiently handling the donations they received at their facilities.

<sup>4</sup> About Salvation Army, <http://www.salvationarmysouth.org/about.htm>.

## 5 Discussion

### 5.1 Theoretical implications

A vast majority of humanitarian operations and supply chain management literature focuses on disaster response (Kunz & Reiner, 2012). Disasters provide interesting and challenging research questions as they introduce urgency, uncertainty, and ambiguity to the problem of effective distribution of relief to affected people. Development aid programs (also called continuous aid), on the other hand are focused on efficiency because they tend to be long-term engagements with significantly less uncertainty (Kovács & Spens, 2007). We also know that most humanitarian organizations engage in both, emergency relief and development programs and integrate their operations such as fleet management to reduce costs (Jahre et al., 2016).

In this paper, we develop a framework (Figure 4) to describe humanitarian supply chains and introduce sustenance aid, where the focal organization is ambidextrous, which means that the focal organization is lean (normal state) and agile (disaster response state) at the same time. Their horizontal structure is designed for efficiency and the vertical structure is designed for responsiveness.

The idea of ambidexterity is different from the operational integration discussed in Jahre et al. (2016). In sustenance aid, the focal organization is engaged in one mode (disaster vs non-disaster) at a time, but can switch between modes without a significant ramp-up process and cost (Lu et al., 2019). This is different from the whole supply chain being ambidextrous. Childerhouse and Towill (2000) argue when the markets are volatile, supply chains need to be lean and agile. They suggest that leanness and agility need to be decoupled, where the upstream echelons should strive for agility while the downstream echelons should be lean. They called this le-agility of the supply chain. Scholten et al. (2010) explored whether the concept of le-agility can be appropriate for humanitarian aid organizations. They confirmed that humanitarian organizations involved in disaster response are very agile and argued that le-agility could be found in humanitarian supply chains. Later, Cozzolino et al. (2012) focus on the three stages of humanitarian operations (i.e. preparedness, response, and reconstruction). Using the World Food Program (WFP) as an example, they show that WFP's Emergency Operations (i.e. disaster relief), and Protracted Relief and Recovery Operations (i.e. "sustaining disaster hit communities as the re-establish their livelihoods and stabilize food security" (p. 24)) are designed differently: the former focusing on being agile and the latter on being lean. As a result, based on the Cozzolino et al (2012) we can assume that WFP is also an ambidextrous organization.

### 5.2 Practical implications

Ambidexterity goes hand in hand with organizational learning (Brix, 2019). In the field of humanitarian logistics, training and skill development is an ongoing challenge, and some studies specifically discussed this topic (Kovács et al., 2012; Allen et al., 2013). However, these studies strictly focused on the disaster organizations. While Lu et al. (2019) focused on six humanitarian organizations operating in Indonesia during a disaster, they identified the need for developing ambidextrous capabilities rather than specialization becomes their key human resource development policy. To achieve this, they propose the organizations to develop systemic training programs to enable their volunteers and staff to perform multiple tasks, as they may be assigned to those in future as need arises, they call this ability as

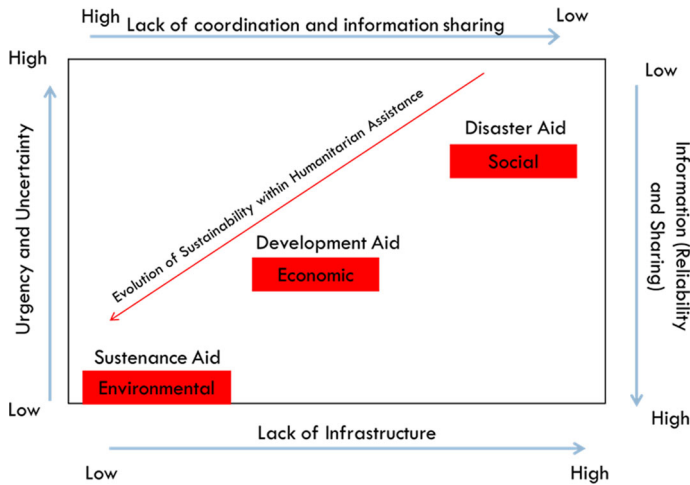
“internal manpower agility”. We go one-step further and identify organizations that operate in multiple humanitarian domains and ask the academicians and practitioners to develop the humanitarian workforce from there. It is very difficult to force one into a disaster domain and expect them to learn all the skillset quickly, rather we could have short training programs or internships in parts of organizations that operate in sustenance or development domain and then develop them to work in disaster zones. Operating in humanitarian organizations requires a staff to interact with government, donors, volunteers as well as people in need. They would have to operate in a not-for profit mindset and it can be best achieved while working in a field. Such a training program might be difficult to design at a time when an organization is responding to a disaster. Therefore, ambidextrous organizations could be fertile ground to train and recruit staff members to work in multiple humanitarian domains.

The operations of many efficient organizations and supply networks were upended during the COVID-19 pandemic. Since, for the most part these companies focused on improving shareholder wealth by cutting waste and operating diligently. However, when this disruption struck, the people in these organizations were thrust in an unfamiliar environment with shortages, shutdowns and excessive delays. Humanitarian organizations like the ones discussed in this article, on a regular basis face these situations. For example, the local food banks serve their day to day needs by planning effectively; but when a disaster strikes, like natural or man-made, they immediately step into mitigating and recovery mode. For commercial organizations, a localized flooding or man-made disasters may not upend the entire supply network like a local food bank and hence these businesses may not have the same approach to mitigation and recovery.

There are different approaches to incorporate flexibility in supply chains (Christopher & Holweg, 2011). Humanitarian networks embrace structural flexibility and commercial businesses embrace more of dynamic flexibility. Specifically, to manage disruptions, it is not enough to be prepared and ready to mobilize, you also need to standardize, innovate and collaborate (Kovacs & Falagara Sigala, 2021).

### 5.3 Future research directions

Assuring the prolonged livelihood of people in need is closely related to sustainability. For example, in the development aid sector the ongoing discussion and objective has been sustainability of aid programs. In contrast, during the response to Haiti earthquake in 2010 some criticized humanitarian agencies for contributing to an environmental disaster (Abrahams, 2014). Increasingly large international NGOs are interested in reducing their carbon footprint (Zarei et al., 2019). The integration of sustainability and supply chain management in commercial operations has received considerable attention (Kleindorfer et al., 2005; Linton et al., 2007; Beamon, 2008; Halldorsson et al., 2009; Dey et al., 2011; Winter & Knemeyer, 2013). In the humanitarian literature however, the same issue has been a topic of discussion only in the last decade (Klump et al., 2015; Dubey & Gunasekaran, 2016; Kunz & Gold, 2017). Haavisto & Kovacs (2013, 2014) and later Oloruntoba (2015) provide frameworks for analyzing how humanitarian organizations integrate sustainable practices into their operations. In this paper, building on our framework (Fig. 4) we argue that in terms of sustainability the *primary* focus of disaster aid, development, and sustenance aid supply chains should be social, economic, and environmental sustainability, respectively. Figure 5 describes this argument. To clarify, we are not arguing that for example, disaster aid supply chains should not care about environmental sustainability, because they should. However, when it comes to



**Fig. 5** Evolution of sustainability within Humanitarian Supply Chains

allocating resources to invest into sustainability, the primary objective of disaster aid should be repairing the social yarn and rebuilding the community: hence, social sustainability.

Operations like thrift stores of Salvation Army and Goodwill stores play a major role in reducing the environmental impact of wastage through recycling. Goodwill’s “reduce, reuse, repurpose” slogan and Salvation Army’s “don’t throw it away—invest it in people”, explains their environmental impact in a nutshell (Narayanan 2013b). They redirect several billion pounds of clothing and home goods from landfills and along their way, these organizations also create jobs and training opportunities for folks in need of work at the same time using the funds generated for humanitarian purposes. In Sweden, about three-quarters of the citizens give away the clothing to charity organizations such as Salvation Army and Red Cross (Svensson, 2007). This behavior cuts right across different social classes, residential areas and income levels in society and could be seen as new points of origin in a second-order supply chain (Svensson, 2007). This is similar to what food banks do, where they direct excess grocery items and unwanted food from corporations, private donors to people in need. However, some may not realize, they even recycle the packaging materials in grocery industry and put them to good use. For example, the most commonly used boxes in food bank operations are the banana boxes, which are sturdy enough to be reused when shipping donated items and need not be returned to the retail stores for reuse (Higgins, 2017; Central Texas Food Bank, 2021). The authors have witnessed food bank managers sending empty trucks to retail warehouses to pick up these empty banana boxes, which according to them are an important commodity item in their logistics operations. Thus, in sustenance aid domain, the primary focus of sustainability would be environment; similarly, in developmental domain the objective is to get the people back to pre-disaster condition or improve their livelihood, hence the primary focus of sustainability would be economic in nature.

The framework introduced in this paper along with sustenance aid supply chains should also lead to further research that takes a system view of humanitarian operations. As humanitarian organizations frequently engage in partnerships and collaborate with governments, service providers (e.g. third-party logistics companies) and other international/national NGOs, the interplay between ambidextrous activities and partnership structures, government



interventions, and evolution of capabilities throughout the pandemic and beyond should present humanitarian operations management scholars with plenty of interesting challenges.

Another potential research direction is related to the organizational behavior side of ambidexterity. For example, Altay et al. (2018) already show that culture plays a moderating role between agility, resilience and performance in humanitarian supply chains. It would be interesting to see how national and organizational cultures affect ambidexterity. Furthermore, whether the national cultural resilience (i.e. countries that are exposed to disasters more frequently than others) would make a difference in organizational capabilities like ambidexterity in the humanitarian context, are interesting future research areas.

## 5.4 Limitations of this research

The first limitation is that we present this study only using two organizations who operate in the US. While this is a limitation, initial studies in developing theories or framework are based on studies of single or two organization (Svensson, 2007; Martinez et al., 2011; Pullman et al., 2018), and future studies should expand and confirm the findings. We hope that this framework invites future researchers to look at such local organizations in developing countries and explore the strengths and weakness of their strategies.

Second, COVID-19 has triggered many different forms of disruption—ripple and resonance effects throughout supply chains. These were non-linear and temporal, arising at many different places in the supply chain and sometimes at different times. Furthermore, the triggers were occurring often peripherally beyond in the latent sphere of their extended supply networks. So, it is necessary to explore how does this ambidextrous capability look like beyond the focal organizations in their respective supply chains and supply networks. In this we focused on the focal organizations alone, future studies should explore the effect of its ambidextrous capability on their supply networks.

Third, we did not explore the difference in performance between an ambidextrous and non-ambidextrous organization that operate in disaster and sustenance aid networks. This requires, a longitudinal study where we could capture information such as cost (efficiency), time to response (flexibility) and the efficacy of the response (savings lives, improving poverty level or any appropriate measures of recovery).

Fourth, the framework introduced in this paper helps us explain how different types of humanitarian operations could be classified. The four dimensions of the framework could possibly be used to classify other non-profit organizations, but we did not explore this scenario as this paper's focus is humanitarian supply chains. As Kovacic & Falagara Sigala, 2021 point out, there are a lot of lessons a commercial organization can learn from humanitarian supply chains in mitigating and overcoming current and future disruptions.

## 6 Conclusion

The COVID-19 pandemic disrupted life as usual around the globe. Efforts to control the spread of the virus with lockdowns and border closures created widespread unemployment. Consequently, food banks have experienced a long-lasting demand peak. Feeding America projects that in 2021, about 42 Million Americans (1 in 8 people) may experience food insecurity (Feeding America, 2021). We analyzed the operations of Feeding America and the food banks in their network, and found the food banks are ambidextrous organizations that can quickly ramp-up from day-to-day operations to disaster response. We also show in this paper



that another organization, Salvation Army, similarly achieves both, efficiency and flexibility. We define these supply chains as ambidextrous humanitarian organizations since they operate in both sustenance aid and disaster aid domains, and propose a framework that should help scholars analyze other humanitarian supply chains. The practical implications of sustenance aid and ambidexterity are significant, especially in the volatile, uncertain, complex, and ambiguous (VUCA) environment the COVID-19 pandemic has created. Sustenance aid and the framework that explains it also opens up further research on sustainability in humanitarian supply chains.

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