Supply chain management in a messy context: The case of humanitarian logistics

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Abstract

Based on literature on "wicked" (Rittel and Webber 2007) or "messy" problems (Ackoff 1981) a conceptual framework for "messy supply chains" is developed. Findings from a series of semi-structured interviews explore the presence and potential effects of each of the "messy" characteristics in humanitarian logistics (HL), with a focus on three case studies of humanitarian responses. Aspects of behavioural complexity are currently underrepresented in HL literature. This could be a major reason why tools and techniques from commercial logistics do not always apply in a humanitarian context, providing researchers and practitioners with new insights into potential approaches to HL challenges.

Keywords: supply chain management, humanitarian logistics, messy supply chains

Topics: Supply Chain Management, Humanitarian Logistics and Operations

Humanitarian Logistics

This study explores the context of humanitarian logistics (HL). HL is a system concerned with "planning, implementing and controlling the effective, cost-efficient 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 meeting the end beneficiary's requirements" (Thomas and Mizushima 2005, p.60). Humanitarian operations are complex, involve many different players, and have a significant financial value. Military, governmental and private organisations of various sizes, motivations and

abilities are typically involved (Kovács and Spens 2009, Tatham and Houghton 2011, Kovács et al. 2012, Pérouse de Montclos 2012). Tatham and Pettit (2010) estimated the humanitarian sector's annual expenditure at more than US$25 billion. Supply Chain (SC) activities are approximated to account for as much as 60-80% of the total cost of humanitarian operations (Van Wassenhove 2006, Blecken 2010). Therefore, efficient and effective HL is vital from an economic standpoint, in addition to the moral imperative that is underlying humanitarian operations. Both academic and professional interest in HL has grown significantly in recent years, reflecting an increase in frequency, and magnitude of disasters in terms of the number of people affected and economic impacts on affected regions. The demand for disaster relief is high and growing. In 2013, 148.2 million people were affected by natural disaster and conflict, and as crises were becoming both longer-lasting and more expensive, inter-agency funding appeals have reached an all-time high in 2014 with more than US$ 17.9 billion being requested in 2014 (OCHA 2015).

Disasters do not only impact the immediately affected area, but have also lead to severe disruptions of global SCs, for example in the high-tech industry when facilities in Japan were hit by the earthquake and tsunami (Gattorna 2006, Day et al. 2012). Improving HL is therefore also in the interest of commercial SC managers and academics. In addition, there are cross-learning opportunities from research done in this area, insights from HL can inform commercial operations as well, for example in regards to resilience and rapid adaptation to change in emergent international SC structures (Van Wassenhove 2006, Day et al. 2012). Despite the unusual operating environment, HL still operates according to the basic premises of commercial logistics and SC management. Techniques and strategies from commercial SC management have been applied to the humanitarian context in many instances, but this has not always resulted in the desired outcomes as expected based on commercial experience (Day et al. 2012). This study introduces and tests a framework that aims to lead to a better understanding of the circumstances that cause this varied success in the adaption of commercial SC practice to the HL context.

Messy Supply Chains

It has been suggested that HL presents a "wicked" problem (Tatham and Houghton 2011). Based on literature on "wicked" (Rittel and Webber 2007) or "messy" problems (Ackoff 1981) a conceptual framework has been developed, identifying five "wicked" or "messy" characteristics SCs might exhibit. This will further the understanding of the aspects of the context of HL that lead to the conditions that influence the relationship between the application of SC knowledge and the outcomes achieved in the context of humanitarian relief.

Conventionally, SCs are depicted as linear connections including the flow of materials, information and money through several tiers of suppliers to a focal company and on to customers, until they ultimately reach the end consumer (for example Mentzer et al. 2001, Mangan et al. 2008, Waters 2009, Chopra and Meindl 2010, Harrison and Van Hoek 2011). This is the basic underlying principle of much of the relevant academic literature. However, over time, differences in SCs have garnered increasing levels of attention. In the operations management literature, different types of SCs have been discussed. Fisher (1997) distinguishes between efficient SCs for functional products and responsive SCs for innovative products, basing this differentiation mainly on the characteristics of the physical products customers demand. Well-known SC types are lean and agile SCs (for example Mason-Jones and Towill 1999, Mason-Jones et al. 2000, Christopher 2000). Lean SCs are noted for their high emphasis on efficiency,

while agile ones are primarily concerned with flexibility in responding to unpredictable demand patterns.

As the business environment becomes increasingly vulnerable, SCs need to exhibit higher levels of flexibility, not merely in reacting to fluctuating demand, but also in adapting their structures to changes in their wider operating context (Christopher 2005). Uncertainty, fluctuating organisational structures and the need to accommodate a range of differing and often conflicting demands from stakeholders have become features of many SCs (Day et al. 2012). However, much of the growing body of SC management literature concentrates on SCs with mature attributes, such as stable organisational structures, a certain level of predictability, and agreement on the aims of a SC, as well as the acceptable ways of achieving those aims. SCs with less mature operating characteristics receive less attention.

This study focuses on a particular type of SC that is non-linear, highly complex and has a significant impact on stakeholders and society as a whole, so-called "messy supply chains" (MSCs) that present "wicked" (Rittel and Webber 1973), or "messy" problems (Ackoff 1981). Complex problems that involve the wider environment and have political and social dimensions, beyond their mere technical or operational issues, have been called wicked (Rittel and Webber 2007) or messy (Ackoff 1981). Messy problems are “complex, emergent, interdependent problems spiralling near the edge of chaos” (Calton and Payne 2003, p. 7). Wicked problems are defined as “social systems problems which are ill-formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing” (Churchman 1967, p. 141). Both concepts stress the complexity of the situations they address and acknowledge that they are outside of the limits of rational control (Habermas 1987).

MSCs exhibit five key characteristics:

1. They present complex, interdependent problems (Ackoff 1981, Calton and Payne 2003, Mingers 2006)
2. They have significant sociopolitical impact (Mintzberg et al. 1976, Mitroff and Mason 1980, Camillus 2008)
3. They are non-routine operations (Lyles and Mitroff 1980, Calton and Payne 2003, Camillus 2008, Baer et al. 2013)
4. They have a multitude of stakeholders with differing sets of values (Wagner 1995, Beattie et al. 2012, Ackermann 2012)
5. They lack optimal solutions derived from quantifiable evaluation (Wagner 1995, Eisenhardt 2000, Carrithers et al. 2008, Lyles 2013)

These criteria apply to a multitude of SCs. For example, socio-political aspects in SCs can be concerns about carbon emissions or corporate social responsibility (Simpson et al. 2007, Anner 2012, Cruz 2013). Non-routine operations are transient SCs that are quickly formed for a specific purpose, but change dynamically and can be disbanded quickly (Day et al. 2012); an example could be the SCs for the Olympic Games (Horn 2012). A multitude of stakeholders can be linked to socio-political concerns (Buysse and Verbeke 2005, González-Benito and González-Benito 2006), but it is a particularly prominent issue in service SCs (Maull et al. 2012). While one or more of the five characteristics may occur in various types of SCs, a MSC is defined as a SC that contains all five of them.

The five characteristics identified are depicted in Figure 1 according to the systems complexity and the behavioural complexity they signify. In the following, this framework will be tested in the context of HL.

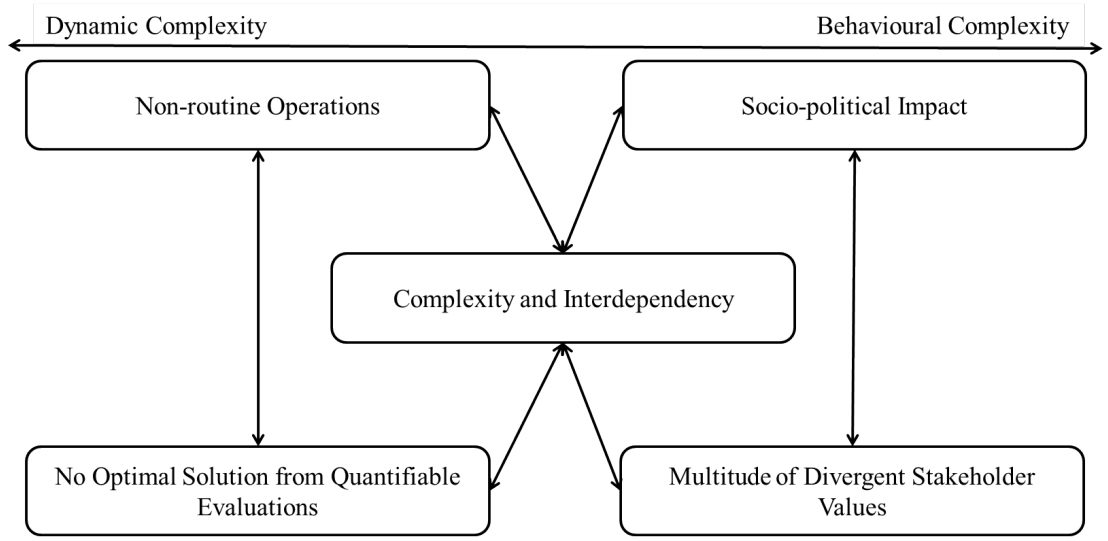

Figure 1 – A conceptual framework for messy supply chains

Research Methodology

The theoretical framework presented in Figure 1 was developed based on literature from two distinctive streams of academia, namely logistics and SC management, and the study of messy and wicked problems. It forms the foundation of the enquiry and is then modified based on insights gained from empirical data and its analysis (Dubois and Gadde 2002). This is congruent with the synthetic case study approach of gathering data, analysing it with theory and incorporating additional theory as required (Langley 1999).

This study is conducted within the critical realist paradigm. Realist theory rejects the notion of a clear linear view of causation as a regular succession of events, as consistent regularities are seen to only occur in closed systems that exhibit both a stable causal power and are situated in an unchanging external environment (Bhaskar 1975, Harré and Madden 1975). However, in open systems, a range of different outcomes can be elicited by the same causal power, as any future event is triggered not only by underlying structures and mechanisms, but also by conditions that consist of a complex interplay of spatio-temporal relations with objects and their inherent causal powers and liabilities (Sayer 2000). Techniques and strategies from commercial SC management have been applied to the humanitarian context in many instances, but this has not always resulted in the desired outcomes as expected based on commercial experience (Day et al. 2012). Therefore, the context of HL exhibits a causal power upon the structures and mechanisms of SC management; this complex relationship is explored through primary research that aims to gather in-depth information on humanitarian responses (Bhaskar 1994, Mingers 2000, Rotaru et al. 2014).

A series of 42 semi-structured interviews has been conducted with individuals involved in humanitarian responses, including logisticians and non-logisticians on both head-office and field level from a range of humanitarian organisation. Table 1 gives and overview of the characteristics of the interviewees. The initial round of enquiry consisted of 14 interviews. Furthermore, through purposeful sampling, case studies were developed on three different humanitarian responses to gain more in-depth information on the particular context of these responses. These case studies are:

1. Haiti earth quake (2010) – 10 interviews
2. Pakistan floods (2010) – 7 interviews

3. Development in sub-Saharan Africa – 11 interviews

Each case study had to encompass at least one disaster according to Guha-Sapir et al. (2012): Firstly, 100 or more people have to be reported affected. Furthermore, a state of emergency has to be declared and there has to be a call for international assistance. A range of disasters has been selected to provide a broader understanding of humanitarian responses. Additionally, the selected humanitarian responses are several years in the past to enable interviewees to assess them more fully.

Table 1 - Description of Interviewees

	Pakistan	**Haiti**	**Sub-Saharan Africa**	**General**	**TOTAL**
Location					
- **Head office**	3	5	6	7	***21***
- **Field**	4	5	5	7	***21***
Org. Size					
- **Small**	2	5	5	4	***16***
- **Large**	5	5	6	10	***26***
Gender					
- **Female**	3	3	4	3	***13***
- **Male**	4	7	7	11	***29***
Job (self-identified)					
- **Logistician**	4	6	6	10	***26***
- **Other**	3	4	5	4	***16***

The interview guide was based on the previously developed conceptual framework for SCs that exhibit "wicked" or "messy" characteristics. Data analysis was conducted using NVivo. Codes were assigned both deductively (based on the conceptual framework) and inductively (emerging from the data) to assign symbolic meaning to the information gathered through primary research (Miles and Huberman 1994).

Findings

The conceptual framework lists five "wicked" or "messy" characteristics SCs might exhibit:

1. They present complex, interdependent problems
2. They have sociopolitical impact
3. They are non-routine operations
4. They have a multitude of stakeholders
5. They lack clear, quantifiable specifications

According to the analysis of the primary data, all of these characteristics are evident in HL. The findings from the initial round of interviews confirm key aspects of HL that have been discussed in the literature, particularly regarding the lack of suitable infrastructure as a major contributor to the non-routine nature of HL. As one interviewee points out *"very often the routes are disrupted, the infrastructure is destroyed or was never there to begin with, so that is a problem because you just can't get through to where you need to be"* (G9). This describes an operating environment that is very different from that of commercial logistics. Another aspect of this are the significant perceived bureaucratic hurdles that have to be overcome in areas that are seldom reached by commercial SCs, for example *"in a lot of countries it has really*

gotten difficult to import stuff… they say that humanitarian assistance has priority and it's made much easier to import the stuff, but that's on paper" (G7).

However, HL's sociopolitical impact is regarded as the most poignant part of the framework, as interviewees in the first round cite political aspects as particularly challenging in a supposedly neutral humanitarian environment, pointing out that *"it is somewhat ironic that because of the neutrality there are a lot of political aspects to our work"* (G11). This also relates to the previously mentioned infrastructural concerns, as negotiating access to affected areas can also be a particularly difficult sociopolitical topic in accordance with the preferences of local, national or international political agendas (for example: *"it's all become very political… for example if you do this and you tell us where the Taliban are, then we let aid in"* interviewee G6 describes being given conditions to aid delivery by military forces). However, the political nature of HL is also evident within organisations as several interviewees stressed in reference to the nature of HL which they described as being inherently adverse to change because of wider political agendas and a lack of market forces, stating that *"you take zero risk… if you do nothing, you stay in your position"* (G14).

Furthermore, the importance of cultural differences in HL was another important element of the sociopolitical aspect of messiness, which interviewees found to be exacerbated compared to commercial environments. Various aspects of this were highlighted with the following quotes serving as examples of common issues:

- *"The linear approach to planning is really a Western model. In these cultures, it is much more about collaborating and developing something together"* (G2)
- *"For example, while dealing with purchasing activities, you will not use the same negotiation methods in Somalia as you would use in Singapore, you have to adapt to the audience… respect of the elders, respect of protocols, respect of religious comportments, genders sensitiveness…"* (G4)

In the Pakistan case study, the multitude of divergent stakeholder views was a particularly prominent aspect of HL, an area which was seen to be much more complex than in a commercial context. Balancing wider political contexts with the local structures was seen to be a particularly difficult part, as interviewees highlighted saying *"it was important to work with those leaders because they are formally part of Pakistan, but really quite independent, so government staff are of limited usefulness"* (P2). A keen interest in local stakeholders was also paramount because of severe security concerns in this humanitarian response (for example: *"you have to have very strong relationships. They keep you safe and make it possible to run the project and to get the supplies we need"* P1). Furthermore, the socio-political impact was seen as particularly challenging, as interviewees cited the tribal culture, as well as both historical and current political tensions as major complicating factors for their work:

- *"The challenge is access, particularly in conflict situations that can be very difficult. I was in a project in Pakistan that ended up failing because of political issues around access"* (P6)
- *"humanitarian work, it's not just about doing some good, it's about politics most of the time… Especially as a Brit you have a lot of history there that is still very present in these countries. There is a huge awareness of history and traditions. Incredible sense of history. Also the political background in Pakistan… That's a very, very different way of working."* (P2)

In the case study on sub-Saharan Africa, these two aspects were most important as well, but with a stronger focus on sustainability and economic development issues, as is to be expected in more long-term oriented developmental humanitarian responses. Depending on the local situation, the extent of the socio-political impact of humanitarian operations varied significantly as the following two examples illustrate:

- *"in Angola, our involvement completely destabilized a local administrator, because we were seen to solve problems and just generally do things so much better than he had ever been able to do. His power base was threatened and that got out of hand very quickly. We were not very popular there, not with those in power at least"* (A9)
- *"In a safe environment like Ethiopia, we will do a lot of lobbying with the local government. The migrant workers we were treating, they have nobody to speak up for them, they have no lobby, so we did quite a lot of that, we increased awareness"* (A1)

With the more long-term orientation of the responses in this context, the number and influence of stakeholders increases, making this a particularly prominent area of messiness. Compared to the emergency responses, a wider range of stakeholders is involved for example *"... the national health system. That can be quite complicated because of bureaucracy. Another important party on that side are the drugs registration and legislation authorities, we have to work with them"* (A6). This reconfirms points raised in the first round of interviews regarding the bureaucratic issues. Furthermore, the non-profit nature of the organisations incorporates stakeholders that finance the humanitarian responses. As one interviewee points out *"sometimes it is difficult to have continuous funding so we can actually keep missions running"* (A3).

The third case study, which focused on the humanitarian response to the 2010 earthquake in Haiti, was the only one in which the non-routine nature of operations was identified as a major contributor to the difficulties of the humanitarian context. *"The situation there was very vulnerable to begin with, then you add to that the earthquake and its aftermath and then you have all the internationals rush in with no idea of the culture or the situation on the ground*" (H1) one interviewee described the unique situation in this particular humanitarian response. This posed particular challenges for logistics and purchasing activities within the organisations (for example: *"we tried to source within the country first, but had to acknowledge that there just wasn't the supply there"* H6).

However, even for the humanitarian response to the 2010 Haiti earthquake, interviewees agreed that the main contributors to the difficulties they faced were socio-political issues. As many stressed the highly political nature of this particular environment, the struggles in reconciling a humanitarian mandate with the realities of the operational environment became particularly apparent. *"Neutrality and all that rubbish… those are all fine principles, but it is a very political context and everybody who does not admit that is simply telling lies. Most of the issues are caused by politics, so you have to come face to face with that. Every decision we make is highly political"* (H6).

In all of the case studies, evidence of the elements of MSCs as defined in the conceptual framework has been found. Aspects of behavioural complexity are particularly important and seen to cause much of the issues that differentiate HL from commercial logistics. This could be a major reason why tools and techniques from commercial logistics do not always apply in a humanitarian context. Improving logistics in humanitarian responses is important because it plays a major part in engaging with stakeholders of humanitarian organisation, fosters relations that are essential for

security, and supports the implementation of sustainable responses, which is of particular importance in developmental missions.

Conclusion

The research presented in this study explores the context of HL through the lens of "wicked" and "messy" problems. In HL, particular conditions exist that influence the outcomes that can be achieved through applying conventional logistics and SC management techniques and strategies. A better understanding of these conditions is achieved, identifying a variety of factors that add to the messiness or wickedness of the system, thus providing reasons for the variance of outcomes. The proposed framework for MSCs contains five distinctive factors that contribute to the unique operating environment. Through primary research, the existence of all of these factors has been proven in HL. Particularly significant contributions to messiness in HL come from the factors with a high behavioural complexity, their socio-political impact and the multitude of divergent stakeholder views.

In validating the proposed framework, a better understanding of the unique characteristics of HL is achieved. The prevalence of behavioural complexity can explain why approaches and techniques from commercial logistics and SC management are not necessarily successful in the humanitarian context. These insights are expected to contribute to the development of management approaches that can further improve the efficiency and effectiveness of HL. Furthermore, exploring non-linear SCs makes a contribution to SC theory.

The validation of this framework is based on a limited number of case studies dealing with only three specific humanitarian responses. It would be beneficial to validate the findings in a broader range of case studies. Furthermore, the MSC framework is only explored in HL. There are other operating environments that could make supply chains messy. Future work could seek to validate the MSC framework in other contexts, e.g. healthcare supply chains, or logistics for large sporting events.

At the next stage of this research project an attempt will be made to tailor management approaches to the identified messy characteristics of HL. Particular attention needs to be paid to stakeholder management and socio-political aspects that may not always receive sufficient attention in approaches that are commonly used in commercial environments.

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