International Transport Forum

Collaboration in Supply Chain Management: A Resilience Perspective

Discussion Paper

171 Roundtable

Ruth Banomyong
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The International Transport Forum

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Introduction

Present day supply chains are global by becoming longer but also more fragile. Supply chains are always faced with constant cost pressures as customers often demand higher service levels without an increase in price. Firms often lack visibility of what is happening within their supply chains. Global supply chains require sophisticated abilities to monitor, report, adjust to, and analyse the flow of events that occur. In order to be able to manage such events, collaboration with partners and suppliers of products and services is needed to transform from a "plan and execute" to a "sense and respond" way of operating.

In the current competitive environment, all firms are faced with numerous challenges such as supply chain disruption, short product life cycle, natural and man-made disasters. However, firms cannot respond to such challenges on their own. They need to work with their supply chain partners and stakeholders in order to be better equipped in dealing with such challenges. Entering into alliances and collaborating with supply chain partners can help reinforce the resiliency of supply chains. At the heart of this collaboration is the sharing of information and data.

Supply chains have to become more resilient. Increasing visibility within supply chains is becoming a critical strategy for all firms. Visibility into events concerning supply chain partners combined with the ability to respond and adjust are the very characteristics that make up resilient supply chains. Long term collaborative partnerships are considered to reduce such risk[1]. Firms are therefore required to focus on improving collaboration, speed of interactions, and process integration with their supply chain partners. The business processes of each partner need to become more deeply entwined with each other in order to enable resilience. Information must flow smoothly and quickly between each supply chain member. The key is communication. Plans change, orders change and the quality of information, production, inventory, transportation directly impact the supply chain and need to be communicated among partners.

As supply chains grow longer and cross international boundaries, the requirement on supply chain members to comply with differing regulations in multiple countries increases. Essential to all supply chains is the reliable supply of materials. Within a resilient supply chain, suppliers would need to exhibit the same characteristics that the focal firm does[2]. It is no longer good enough to be reliable in normal circumstances, but supply chain members also need to be a reliable during unusual circumstances.

Many researchers have studied supply chain collaboration and its benefits since the early 2000s (Horvath, 2001; Min et al., 2005; Sahay, 2003; Zacharia et al., 2009; Lehoux et al., 2014).Cost savings from lower inventory levels and reduction in the number of warehouses and distribution centres are some of the usual consequences from supply chain collaboration. Firms that collaborate can improve their business performance, improve customer satisfaction, increase market share, and gain more revenue while at the same time enhance their positive relationship with supply chain partners. Collaboration can help develop both tacit and explicit knowledge (Kahn et al., 2006) to support supply chain competitive advantages and sustainability.

The purpose of this paper is to explore how collaboration between stakeholders and the establishment of alliances can help make supply chains more resilient. The paper will look at innovative ways to operate supply chains through methods such as crowd shipping, gainsharing, and the share economy and how these can reinforce resilience of the supply chain. Data sharing plays an important role in supporting closer collaboration between stakeholders while public-private partnerships can help focus the actions of

all stakeholders on making supply chains resilient and hastening the pace of recovery in the event of a disruption or natural disaster.

Drivers of Supply Chain Collaboration

Several authors have studied and mentioned the benefits of supply chain collaboration. Horvath (2001) has listed one benefit of collaboration in terms of information infrastucture such as theconnectivity network that will be opened at lower cost. This helps smaller firms to access information at a lower investment cost. Min et al., (2005) studied supply chain collaboration by using a qualitative approach and observed that firms gain benefits from long-term collaboration as they are often not seen in the early period of collaboration. The usual consequence of collaboration is presented in the form of efficiency, effectiveness and profitability.The benefit of collaboration in terms of efficiency are cost reduction, reduced inventory and shortened lead-time. Derived effectiveness is reflected in customer service improvement, market share expansion and higher revenue. Having improved levels of collaboration can also be considered part of risk mitigation strategy when developing resilient supply chains.

The purpose of this section is to provide an overview of the role played by collaboration in supply chain management (SCM) as well as its impact on supply chains. Collaboration with suppliers or customers provides different types of benefits as it involves different activities (Sahay, 2003). The benefit from collaboration with suppliers can be the improvement of product lead time, better order fulfilment, having access to continuous supplies and better resource utilisation. Customer collaboration with firms can provide new trends of product design and better response to market changes.

Research into supply chain collaboration is a fundamentally important area because collaboration and integration is claimed by many authors to be akin to supply chain “utopia” and synonymous with management excellence (Christopher, 1998; New, 1996). Indeed, in the current climate of global supply chain competition, collaboration and integration is regarded as a prerequisite for enabling winning performance (Lee, 2000; Margetta, 1998). Published studies have focused on: power position in the supply chain (Cox, 2001); purchasing collaboration and integration (Narasimhan and Das, 2001); impacts of simplified material flow (Childerhouse and Towill, 2003); barriers to implementation (Pagell, 2004); and shared resources (van Donk and van Vaart, 2005), among others.

Despite more than 20 years of academic publications, there remains a significant gap between supply chain collaboration theory and practice. Also, due to the natural tendency to highlight “best practice” companies, supply chains are often perceived to be in better shape than reality. A comprehensive site-based study by Towill et al., (2000), of the European automotive sector, found that only 10% of supply chains could be regarded as collaborating fully to the extent of being integrated. A survey by Poirier and Quinn (2003) likewise concluded that just 10% of supply chains in North America had achieved external integration thus reflecting the limited levels of collaboration.

The foundation of supply chain collaboration can be summarised as the activities between supply chain members where information is shared, trust and openness is present, coordination and planning is jointly done, mutual benefits and sharing of risks exist between supply chain members, and a mutual

recognition of mutual interdependence with shared goals that is subject to compatibility of corporate policies.

Even though collaboration provides many benefits to supply chain members, there exist many barriers to collaboration in supply chains. These obstacles exist at all the stages of the collaboration process (Lehoux et al., 2014). The development of the first stage of collaboration will be on how to select supply chain members to collaborate with, how to establish the legal framework, etc.

When collaboration begins, issues such as the sharing of accurate information, the adjustment of business processes and the negotiation of common order and delivery plan can become challenging. Fawcett et al., (2008) studied the benefits and barriers which occurred when supply chain collaboration is being developed. Their findings show that inadequate information sharing is the key obstacle for supply chain collaboration. Supply chain collaboration failure has many consequences such as the 'bullwhip effect' from lack of information sharing. Barriers to collaboration can also be found in the behaviour of supply chain members such as bullying, self-interest, opportunism and an exclusive focus on price and cost.

Collaboration is a driving force in SCM (Horvath, 2001). It has been viewed as the basic foundation of a firm's relationships (Min et al., 2005). Literature has defined collaboration under several contexts. Collaboration can be defined as "A firm's culture of working together with other firms toward a common set of goals that bring mutual benefits to a partnering relationship" (Min et al., 2005). Collaboration is "the process of working together among independent firms along a supply chain in delivering product to end customer" (Simatupang and Sridharan, 2008). Another proposed definition is "the ability to work across organizational boundaries to build and manage unique value-added process in order to better meet customer needs" (Fawcett et al., 2008).

Scholars have divided and categorised different collaboration types. Kahn et al., (2006) have identified four types of collaboration based on information technology and relationship aspect. The first type is "transaction" based collaboration. This type of collaboration focuses on demand and delivery between supply partners. There is low investment in information technology and relationships between the actors involved. The second is "technology" based collaboration. This type of collaboration focuses and relies on information technology with information sharing between partners. The third is "affinity" based collaboration which focuses and relies on relationship management. Trust and commitment is the foundation of this type of collaboration. The last type is "integral" based collaboration. This type of collaboration is a combination of relationships between the actors involved and information technology. This is the most complex type of collaboration. However, the "integral" based collaboration has an advantage over other types of collaboration as it can sustain longer term relationships and further develop supply chain resilience.

Sahay (2003) further explained three types of collaboration; manufacturing/supplier collaboration, manufacturer/customer collaboration and collaboration with Third-party logistics (3PL) and fourth-party logistics (4PL). Each type of collaboration provides different benefits to firms and supply chains according to the complexity and critical processes in supply chains. Horizontal and vertical collaboration was also explored by authors such as Simatupang and Sridharan (2002) and Barratt (2004). Horizontal collaboration is the inter-firm relationship within the same supply chain levels (i.e. competitors or non-competitors). Vertical collaboration is the inter-firm relationship at different levels within supply chains such as the relationship between supplier and manufacturer or manufacturer with customer. The vertical collaboration form is often referred to as customer relationship management (CRM), collaborative planning forecasting and replenishment (CPFR), and vendor managed inventory (VMI) (Barratt, 2004).

Barratt (2004) also suggested that supply chain collaboration is essential and will offer more benefits if there is a segmented approach for collaborating with main customers and main suppliers.

Literature on supply chain collaboration is comprehensive and it can be observed that five key variables are critical for supply chain collaboration to occur. The variables are described below.

Table 1. Drivers of collaboration

Driver	Definition	Supporting Literature
Trust	Degree to which supply chain partners have the intention and ability to work for the good of chain.	(Morgan and Hunt, 1994), (Kahn et al., 2006), (Jones et al., 2014), (Wiengarten et al., 2010).
Commitment	An implicit or explicit pledge of relational continuity between exchange partners.	(Mentzer et al., 2001), (Min et al., 2005), (Spekman et al., 1998)
Decision synchronisation	Joint decision making in planning and operational contexts.	(Simatupang and Sridharan, 2005), (Min et al., 2005), (Cao et al., 2010).
Incentive alignment	The degree to which supply chain members share costs, risks and benefits.	(Slone et al., 2007),(Simatupang and Sridharan, 2002), (Simatupang and Sridharan, 2005), (Mentzer et al., 2001), (Cao et al., 2010).
Information sharing	The willingness to make strategic and tactical data available to other member of the supply chain.	(Barratt, 2004), (Simatupang and Sridharan, 2005),(Min et al., 2005) (Slone et al., 2007), (Simatupang and Sridharan, 2008) (Wiengarten et al., 2010).

Trust

According to Min et al. (2005), collaboration can be used to establish the initial trust baseline. Trust is one of the key parameters that supports supply chain collaboration (Spekman et al., 1998; Kahn et al., 2006; Vlachos and Bourlakis, 2006). Trust is defined as "the degree to which supply chain partners have the intention and ability to work for the good of the chain" (Morgan and Hunt, 1994). The contribution of trust can be in the long-term relationship between firms. (Barratt, 2004). If there is a lack of trust, firms may not intend to collaborate with supply chain partners. Jones et al., in 2014, have studied the role of trust in small and medium-sized firms. They observed that the benefit of firms with trust-based collaboration acheived better performance. Another research explored the collaboration between upstream supply chain in the automotive sector (Mamad and Chahdi, 2013). The finding is that trust has a positive impact on supply chain collaboration.

Commitment

Since relationships within supply chains are not equal, focal firms are found to have more bargaining power within the chain. Commitment from the focal firm is therefore required as a basic foundation (Spekman et al., 1998). Commitment is defined as "an implicit or explicit pledge of relational continuity between exchange partners" (Mentzer et al., 2001). Commitment can be explained as the tolerance of member in terms of their respective deficiencies and no advantage taken from a weaker partner (Min et al., 2005).

Decision synchronisation

Decision synchronisation is defined as “the joint decision making in the planning and operational contexts” (Simatupang and Sridharan, 2005). The main purpose of such planning is to utilise the capacity and resources of firms and partners. This joint planning can help to prioritise objectives of supply chain members and be embedded in strategic planning (Min et al., 2005). Many scholars have paid attention to decision synchronisation as a key element of supply chain collaboration. Simatupang and Sridharan (2005) studied the effect of decision synchronisation through a firm survey in New Zealand. Their findings suggested that decision synchronisation has a significant impact on collaboration level and operational performance (fulfilment, inventory and responsiveness). Another similar study was conducted with US manufacturing firms (Cao et al., 2010), the findings suggested that decision synchronisation had a positive impact on collaboration, the same as in New Zealand.

Incentive alignment

Slone et al., (2007) described incentive reward in the supply chain. The purpose of incentives is to encourage and reward supply chain members who support overall supply chain objectives. However collaboration requires more than just benefit sharing among supply chain partners. Incentive alignment has been categorised into three different types (Simatupang and Sridharan, 2002). The first type is reward as motivation to reach assigned targets. The second is pay for performance. The last is fair sharing of benefit and cost. Incentive alignment can be defined as "The degree to which supply chain members share costs, risks and benefits" (Simatupang and Sridharan, 2005). Incentive alignment can also be referred to as mutually sharing risk and reward. Sharing risk and reward is a vital element for collaboration in long-term relationships (Mentzer et al., 2001). There are empirical studies which suggest that incentive alignment significantly impacts a supply chain’s operational performance (Simatupang and Sridharan, 2005; Cao et al., 2010).

Information sharing

Information sharing is a vital part of the collaborative process. Information sharing has been defined by the Global Logistics Research team at Michigan State University (1995) as "the willingness to make strategic and tactical data available to other members of the supply chain". Many authors have studied the importance of information sharing on collaboration (Barratt, 2004; Simatupang and Sridharan, 2005; Min et al., 2005; Slone et al., 2007; Simatupang and Sridharan, 2008; Wiengarten et al., 2010). Information sharing can be done in many forms such as marketing promotion plans, inventory level partnering, and the sharing of point of sales data (Min et al., 2005). An information sharing process is required for routine operations but also for tactical and strategic decisions between supply chain partners.

This sharing of information would improve supply chain performance (Barratt, 2004; Min et al., 2005). Wiengarten et al., (2010) have expanded the collaborative concept from Simatupang and Sridaharan (2005) by investigating the impact of information sharing, incentive alignment and decision synchronisation. The scope of the study focused on the quality of information. Findings are that information sharing plays an important role and has a positive impact on operational firm performance even with low or high quality of information.

Firms are connecting to each other electronically more than ever, either by using some form of electronic document processing (e.g. EDI, XML, etc.) or by using a web-based collaborative environment (portals), and in some cases both. In each case, these methods allow for information to be passed between firms and supply chain partners quickly and accurately. This allows for changes and the responses to changes to be passed seamlessly between partners, allowing everyone involved to be part of the solution.

The ability to anticipate and respond to supply chain risk has emerged as a vital organisational capability in an operational environment characterised by increasing levels of turbulence, uncertainty, and complexity. Collaborative relationships between internal functional areas as well as with external customers and suppliers have been proposed as a key determinant for enhancing supply chain resilience (Randall, 2012).

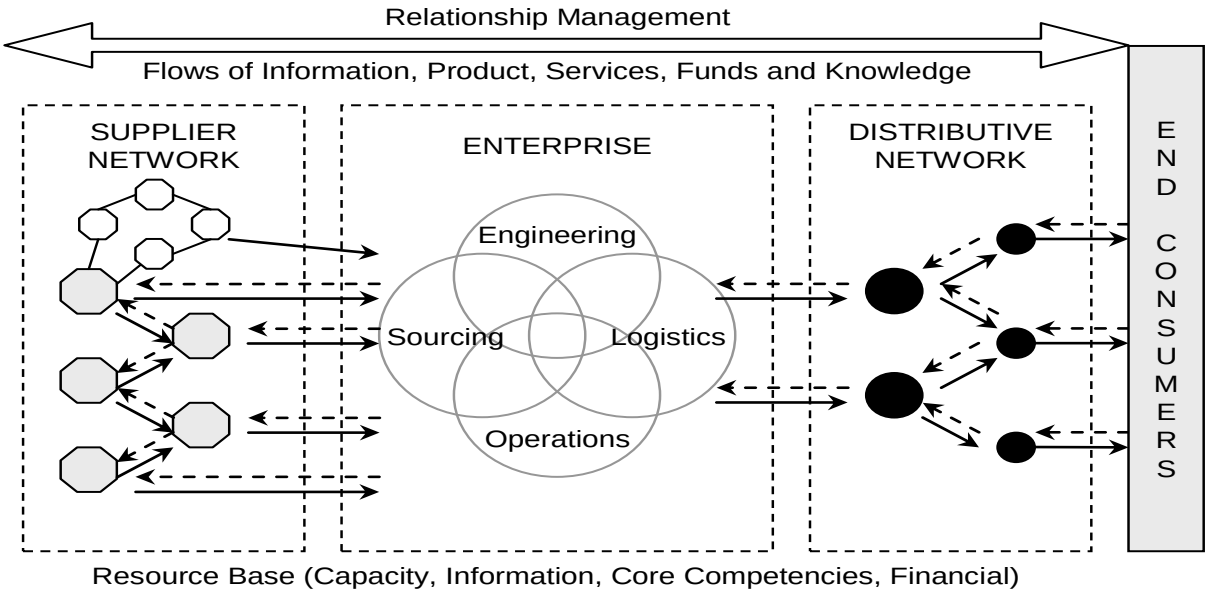
The key requirements for collaboration need to be contained within an established supply chain and objectives, information sharing and the establishment of trust within focal firms and with supply chain partners. A similar concept to explain the evolution of collaboration has been discussed by Stank et al., in 2011. Firms can develop collaboration by starting with the recognition of the power of collaboration. Trust will need to be developed through the establishment of the working process between partners. The next step is the development of common performance indicators to jointly measure supply chain objectives. A collaboration index has been developed based on three key elements of information sharing, decision synchronisation and incentive alignment (Simatupang and Sridharan, 2005) where an higher collaboration index score positively impacts on operational performance. From the same authors, an expanded model of supply chain collaboration is presented where the main structure of the supply chain model includes: a collaborative performance system, information sharing, decision synchronisation, incentive alignment, and innovative supply chain processes (Simatupang and Sridharan, 2008).

Lee (2000) suggested three dimensions by which to examine the extent of supply chain collaboration:

- Organisational relationship linkages
- Information integration
- Co-ordination and resource sharing

Similarly, van Donk and van der Vaart (2005) proposed four comparable dimensions, by subdividing co-ordination and resource sharing into two categories: flow of goods and planning and control. In a similar vein, Handfield and Nicols' (2002) visual representation of an integrated supply chain, reproduced in Figure 1, similarly emphasises close relationships which should result in more effective use of the combined resource base together with better integrated information and material flows. The integrated supply chain is an outcome of enhanced supply chain collaboration.

Figure 1. The integrated supply chain



Source: Handfield and Nicols (2002)

Figure 1 illustrates the most common supply chain approach; that of a focal organisation and its collaboration with the wider supply chain. Full collaboration is not universally accepted as an ideal state applicable to all supply chains. For example, van Donk and van der Vaart, (2005) argued that collaborative practices should be more fully exploited during circumstances of high demand uncertainty.

They comment that collaborative practices are hardly possible or feasible in circumstances of shared resources and limited capacity. In a similar vein, de Treville et al. (2004) concluded that demand collaboration is only warranted when there is sufficient demand variability; such practice can be limited to just physical flow and stock management when customer demand is known to be relatively certain. Lee's organisational relationship linkages dimension (Lee, 2000) has been particularly scrutinised in literature, with Cox (2001) arguing that not all relationships should be based on full collaboration; rather that the collaboration type should be matched to supplier and customer dependency.

Supporters of supply chain collaboration greatly outnumber opponents. In fact, many authors assert that collaboration is an essential attribute of modern SCM (Christopher, 1998; Narasimhan and Das, 2001). Bowersox et al. (2002) provide a very insightful explanation of how collaboration increases competitiveness via value creation by:

- Expanding the scope of economies of scale to a wider setting, hence reducing waste and lowering costs.
- Increasing market value by providing the customer with convenient product assortment.
- Increasing relevancy value, by offering customised products tailored to customers' specific needs.

Advantages of collaboration have been investigated via a number of surveys that have evaluated its impact on performance. Gimenez and Ventura (2003) showed a positive correlation between external collaboration and performance in a survey of large Spanish grocery manufacturers. The same conclusion

was reached by Frolich and Westbrook's (2001) through an international survey of fabricated metal products, machinery and equipment manufacturers. In an assessment of a sample of management consultancy case studies Hall et al. (1993) conclude that collaboration is a prime determinant of the level of increased performance and, being a non-linear relationship, doubling the span of collaboration generates more than twice the increase in productivity.

It is important to emphasise that the debate in literature is not about full collaboration versus no collaboration. Rather, it is about how much collaboration is justified and under what circumstances. The answer to these questions depends very much on the nature and purpose of the individual supply chain. Common across all processes is the drive to reduce costs and improve performance. Firms are trying to drive costs out of the system by optimising routes and selection of carriers.Care must be taken to balance the cost reduction drive to those of the flexible resilient organisation, since it is generally possible to get lower costs with restrictions, organisations will end up paying more for the desired flexibility and resiliency.

In addition to a general investigation of supply chain collaboration uptake, it is interesting to compare the international uptake and application of the concept. Such international comparison studies are still relatively rare. Closs and Mollenkopf (2004) investigated the supply chain competency/performance relationship in North American firms and compared findings with a sample of Australian and New Zealand firms. The Halldorsson et al., (2008) qualitative study examined SCM definitions, facilitators and barriers to its implementation, and compared data from North American firms with a Scandinavian sample.

Childerhouse et al., (2011) examined collaboration within three different national settings: New Zealand, Thailand, and the United Kingdom. Publications in the field of SCM within the New Zealand context are very limited (Mollenkopf and Dapiran, 2005). Those few publications currently available highlight that a gap exists between theory and current best practice. Wilson and Sankaran (2001), for example, identified that New Zealand's local manufacturers are lagging behind their overseas counterparts in many key areas of SCM. Basnet et al. (2003; 2005) recently supported these findings by highlighting that the latest theoretical supply chain developments are poorly understood and reported an equally disappointing uptake for supply chain collaboration in New Zealand firms. Similarly, Böhme et al., (2008) reported poor supplier relationship management practices by many New Zealand companies, resulting in weak linkages with key suppliers.

Supply chain management (SCM) in Thailand is still in its infancy stage. This is particularly true for local small and medium enterprises (SMEs) and family-owned businesses. Supply chain management practices have been widely implemented between multinational firms operating in the country but these practices have not yet reached the small and medium sized local suppliers (Wong and Boon-itt, 2008). Supply chain performance for most local firms is weak but with strong potential for improvement, as most business owners do not have a grasp of the benefit of supply chain collaboration. During a supply chain assessment exercise conducted on many local firms it was discovered that existing assessment tools such as the SCOR model or the Enkawa Supply Chain Logistics Scorecard were too complicated and too difficult to use, especially when dealing with SMEs and that collaboration was limited (Banomyong, 2008).

The practice of supply chain collaboration in the UK appears to vary. Within some sectors, such as grocery and the automotive sectors, there are several best practive examples. For example, Tesco is twice as profitable as the grocery industry average and have led the way in terms of supply chain collaboration practice in the UK (Potter et al., 2007). Nissan and Toyota factories in the UK are some of the most efficient car production sites in Europe. However, SCM practices seem to be rather

unsophisticated with less collaboration. In Quayle's 2003 survey of 480 SMEs, only 25% had a strategy for SCM and of that 25% only 10% had a senior executive responsible for the supply chain, whilst 75% of the 25% observed that even traditional supply chain practice was a problem from them.

Internationally, supply chain collaboration remains a challenge for many practising supply chain managers. The majority of the organisations studied are really struggling with the fundamental concept of removing internal boundaries and sharing order information along the supply chain (Childerhouse et al., 2011). Most organisations suffer from high levels of uncertainty.

When a company designs and manufactures products, the products must often be sent and transported over vast distances to the purchasers or distributors of the products. Establishing effective shipping methods and supply chains can be very complicated and difficult. Thus, many companies employ logistics alliances to provide assistance in establishing supply chains for the company. Logistics alliances are therefore another well-studied phenomenon. By analysing both research streams of vertical and horizontal logistics alliances, Brekalo and Albers (2016) identified four main categories in the domain of effective logistics alliance design and management: alliance composition, alliance structure, relational behaviour, and operational process design. It is interesting to note that the concept of alliances tends to focus more on the relationship between manufacturers/shippers and logistics service providers while collaboration seems to encompass the whole supply chain.

Supply Chain Resilience

Firm resilience and therefore survival in the modern business environment is no longer an issue of one firm competing against another firm but has, instead, become an issue of one supply chain competing against another supply chain (Christopher, 1992). This evolution in strategy has resulted in higher levels of network complexity for contemporary supply chains. Because supply chains can be extremely sensitive to small disruption from anywhere in the network, "catastrophes" are perhaps more likely to happen because of the cascading features and nonlinear effects characteristic of complex systems (Choi et al., 2001). The decisions facing contemporary business managers increasingly require consideration of influences originating both internally and externally to the organisation, and beyond even first tier suppliers and customers. In the recent past, academics and practitioners alike have acknowledged that a holistic, or systems perspective of the supply chain has become necessary to manage it effectively in the current business environment (Mentzer et al., 2001).

As noted by Christopher (1992), a supply chain is not a chain in the literal sense, but rather a network of organisations and relationships. This more complex view of supply linkages has led many to describe the supply chain as a network (Christopher and Jüttner 2000; Lambert et al., 2005). The network-based model has evolved over the past few decades as firms have moved away from hierarchical, vertically-integrated structures to networks of partnerships with key suppliers and customers (Christopher and Jüttner 2000).

Lastly, Christopher's definition emphasises the notion that organisational membership of the supply chain is interconnected through a series of relationships or linkages. The different entities that comprise

the supply chain, from point of origin to point of final consumption, are connected via flows of material, information and finances (Craighead et al. 2007). Collaboration between partners is therefore critical.

The term resilience has been defined broadly as possessing "the skill and capacity to be robust under conditions of enormous stress and change" (Coutu 2002). Resilience reflects the capacity of the supply chain to respond and recover to the same or better state after the disruption. Beyond enabling supply chains to mitigate the effects of disruption, resilience can be a source of competitive advantage when the focal company is able to respond more quickly and effectively than its competition (Rice and Caniato 2003; Christopher and Peck 2004).

Hamel and Valikangas (2003) suggested firms needed to overcome four challenges to achieve resilience:

(i) Conquer organisational denial by acknowledging that past business models and strategies are threatened by environmental change.

(ii) Continuously explore a variety of strategic alternatives through innovation and experimentation.

(iii) Allocate resources to novel strategic options.

(iv) Devote as much energy to renewal and evolution as to optimisation and operational efficiency.

Considering the above, resilient supply chains need to recognise that in an age of uncertainty, the business model that provided a competitive advantage yesterday is no guarantee of success tomorrow. An alternate view of supply chain resilience emphasises the capacity of the enterprise to prepare for, respond to, and recover from supply chain disruption (Christopher and Peck, 2004; Sheffi and Rice, 2005).

Supply Chain Collaboration and Resilience

Scholten and Schilder (2015) described how specific collaborative activities (information-sharing, collaborative communication, mutually created knowledge and joint relationship efforts) increase supply chain resilience via increased visibility, velocity and flexibility. This was one of the first papers to provide an in-depth insight into collaboration as a formative element of resilience in a supply chain setting. A series of propositions in the paper explain the specific influence of collaborative activities on supply chain resilience beyond a single company perspective.

Further to this, Botes et al., (2017) provided managerial insights into the importance of collaborative communication and information-sharing in gaining supply chain visibility, helping early identification of impending disruptions. Subsequently this enables flexibility through allowing sufficient time to coordinate other supply chain resources to achieve the desired outcome.

Communication facilitates the streamlining of supply chain processes, thereby enhancing the velocity of subsequent supply chain responses to a disruptive event. Another managerial contribution directly relates to supplier management through collaborative supply chain efforts and the leveraging of supply chain members' capabilities. Managers can enhance supply chain flexibility through the reciprocal leveraging of partners' resources to respond to a disruptive event under capacity limitations. Internal

process insights are gained through a two-way knowledge flow, thereby enhancing visibility. The importance of collective learning from past disruptions in gaining visibility and velocity offers managers some insight into how joint retrospective learning from disruptive events allows a supply chain dyad to quickly identify an impending disruption.

Velocity is also gained through the fact that improved insights are gained and mitigation procedures are put in place. Whereas the above-mentioned managerial implications are generally known within industry, supply chain practitioners should be aware that collaborating with suppliers should not be directly aimed at increasing resilience. Instead, buyer-supplier collaboration should enable concerted efforts towards enhancing overall supply chain flexibility, visibility, and velocity individually, and the success of such collaboration should be measured in terms of overall performance and competitiveness.

A number of resilience scholars point to collaboration among the organisational capabilities that offer the potential for overcoming turbulence and disruption in the supply chain (Christopher and Peck, 2004; Sheffi, 2005; Juttner and Maklan, 2011). According to Christopher and Peck (2004), the core intuition regarding the relationship between collaboration and resilience is the notion that collaborative exchange enhances resilience by reducing uncertainty about the state of the supply chain.

The exchange of information and application of shared knowledge reduces uncertainty at each level of organisational analysis (strategic, operational, and tactical). Analogous to the notion of contextual knowledge described by Sanders and Ritzman (1995), collaboration serves as a mechanism for enhancing awareness of strategic threats and opportunities, operational disruptions in supply and demand (Christopher and Peck 2004).

Exchange of information in the digital economy

The exchange of information is a key condition for supply chain collaboration which will lead to supply chain resilience. However, the rules of collaboration are currently being rewritten with the emergence of the "digital" economy. According to Oxford Economics[3], the current economic conditions are fostering investment in technology as emerging markets ramp up their demand for technology to fuel growth and advanced markets seek new ways to cut costs and drive innovation. The digital economy has impacted supply chains and how they can collaborate.

The internet has transformed many aspects of the global marketplace, from consumer behaviour to new business models. Mobility, cloud computing, business intelligence and social media underpin how the internet has changed our world. Crowd shipping[4] is an example of a business model where an online platform acts as the coordinator of supply and demand information. This enables an improved means of resource utilisation and reduces under-utilisation of transport. There are different crowd shipping platforms depending on their target users but their long term sustainability remains to be seen.

Industries are undergoing digital transformation. While new firms can embrace the digital marketplace straight away, established firms will need to transform how they sell, price, produce and deliver products and services. Real time business intelligence and predictive analysis is required not only for faster decision-making, but to cope with unexpected market risks and opportunities.

The severity of supply chain disruption can be mitigated through warning capabilities and recovery capabilities (Craighead et al,. 2007). Supply chain collaboration serves as a form of environmental scanning that enables organisations to detect pending or realised disruption threats (Sheffi 2005). The parties involved in collaborative relationships must demonstrate a willingness to share sensitive information related to risk and use collaborative predictive analysis (Juttner and Maklan 2011).

Firms need to reorganise to fully embrace the digital economy. To operate on the global digital playing field, where new rivals are unencumbered by rigid policies and thinking, astute firms are moving away from strict hierarchical decision-making and closer to a network structure that is more market-like and organic. From crowdfunding platforms to ridesharing apps, the digital economy is thriving. Almost every major sector has been affected by this phenomenon, with collaborative consumption posing a serious alternative to more traditional business models. Crowdsourced shipping, where individuals bring items to people along their route has shaken up the delivery market.

Major companies such as Walmart and DHL have explored the possibilities of people to people delivery, and a large number of specific shipping start-ups have sprung up in recent years. However, this does not mean that collaboration is automatic as the exchange of information is just one of the necessary conditions. The other conditions will still need to be fulfilled for collaboration to actually occur and develop resilience in the supply chain.

Incentive alignment in the digital economy

Gainsharing[5] has been a topic of both criticism and acclaim throughout the business world, and the same is true for gainsharing in logistics. Initially, gainsharing seems like an amazing means of expanding business, but it can prove to be exceedingly difficult to manage and even more difficult to profit from. Gainsharing comes with its share of benefits too, and more logistics services providers are starting to use a newer pricing model such as vested outsourcing[6], in place of rigid gainsharing models. University of Tennesse researchers coined the term "Vested Outsourcing" because they found these successful agreements were the result of a company and its service provider having a vested interest in each other's success and working collaboratively to achieve mutually created "desired outcomes." Their research identified five things in common across all of the highly successful outsourcing relationships studied:

1. Focus on outcomes, not transactions.
2. Focus on the "What," not the "How."
3. Agree on clearly-defined and measurable outcomes.
4. Optimize pricing model incentives for cost/service trade-offs.
5. Insight, not oversight of governance structure.

One of the key drivers for successful vested outsourcing is "collaboration" between the manufacturer/shipper and its service providers. This terminology is somewhat similar to logistics alliances. This is a common problem in the literature where many terms used have similar meanings but are often applied in different contexts thus creating uncertainties related to the coverage of similar terms. There is a need to further develop a more precise typology of terms related to firms working together in different manners.

Box 1. MacDonald's Secret Sauce for Supply Chain Success

McDonald's, its owner/operators, and their suppliers have a vested interest in helping each other succeed. Kroc's "System" philosophy that McDonald's uses is often described as a three-legged stool. One of the legs is McDonald's employees, a second leg is the owner/operators that run the restaurants, and the third leg is McDonald's supplier partners. Kroc's ultimate desired outcome was profitable, individual stores serving consistent quality products. Finding suppliers who would be partners in the process was critical. Kroc was determined to work with suppliers that had the same long-term thinking.

Rule 1: Focus on outcomes, not transactions

McDonald's consciously makes a decision to not conduct business with strategic suppliers on a transactional relationship, but instead insists suppliers have long-term relationships that drive business value and achieve McDonald's key business outcomes.

Rule 2: Focus on the 'what', not the 'how'

One of the ingredients of Kroc's secret sauce was to know McDonald's core competency versus that of his suppliers. While Kroc had the vision, he knew he needed to rely on the suppliers and restaurant owner/operators for implementation.

Rule 3: Agree on clearly defined and measureable outcomes

While food safety and quality is at the top of what McDonald's measures with suppliers, it's only part of the picture. Pre-defined clear and measurable outcomes must be agreed with the owner/operators and the suppliers.

Rule 4: Pricing model/incentives for cost/service trade-offs

The pricing system comes back to the concept of the three-legged stool. McDonald's, store owner/operators and suppliers each must secure a profitable, long term financial picture – one that keeps the company first and, as such, secure stable futures for all.

Rule 5: Govern for insight, not oversight

McDonald's and its suppliers do business the old-fashioned way, with a handshake instead of a formal agreement. When you have a "no contracts" philosophy with suppliers, values matter when it comes to governance, or as Kroc wrote, "The basis for our entire business is that we are ethical, truthful, and dependable. It takes time to build a reputation. We are business people with a solid, permanent, constructive ethical program that will be in style years from now even more than it is today."

Source: http://www.supplychain247.com/paper/case_study_mcdonalds_secret_sauce_for_supply_chain_success

'Vested Outsourcing' transforms gainsharing by making the process more visible and holding both parties accountable. Unlike gainsharing, the level of trust is defined by a continuing focus on improving all profits for the shipper using the services. This may include increasing technology, reducing the time required to complete workflows and managing shipments.

Gainsharing has been around in some form for ages. Basically, one person or organisation agrees to split the profits of joint enterprises when a second partner does something to help the first. Gainsharing in logistics is often used by third-party logistics providers (3PLs) as a pricing model. The initial investment is low as shippers do not have to pay significantly to start taking advantage of the 3PL's services. Many shippers turn to gainsharing pricing models because they require little initial investment, but the overall

cost of a 3PL's service through gainsharing could easily exceed the reasonable expectations of the shipper. The primary benefits of gainsharing are simple to understand. A gainsharing partner provides a service, technology or methodology for a shipper to use. In some cases, the service provider may help deploy these services, and a quick return on investment is achieved once savings are realised. The provider receives a share of the shipper's profits, and the growth of both entities increases. Another benefit of gainsharing is that it would seem to improve accountability.

Two organisations that share databases would naturally lead to more check points and opportunities to uncover ways to save money. However, the tendency to "cut and run" with a shipper's profits make this benefit difficult to achieve. Once the provider has received payment, it is the opportune time to leave the shipper to fend for himself. Unfortunately, these systems and processes are left unattended and unevolved, making the shipper vulnerable to future problems, in this pricing model. With the gain sharing model, shippers must place a large amount of trust in being provided with accurate data. Shippers now more than ever demand visibility and control over their supply chain. The gain share model doesn't seem to be consistent with the transparency, flexibility, and control that many shippers in the market are looking for[7]. The issue of trusting the service provider is therefore critical

While these pricing models appear similar, they are not the same. In other words, the degree of work completed by the Vested Outsourcing partner is not as minimal as would have been normally seen in gainsharing. Furthermore, Vested Outsourcing uses real-time data to keep performance records and improvements on track and accessible. As a result, the shipper can more accurately determine the overall cost of using Vested Outsourcing services in both short- and long-term scenarios. In gainsharing, the costs are almost always focused on immediate costs and profits, but Vested Outsourcing goes a step further by keeping the partnership together even when the initial profits have been divided.

The only way to guarantee the future of a successful business partnership through gainsharing is by abandoning the primary principles of this pricing model in favour of a mutually beneficial, detailed and written agreement. Additionally, ongoing re-evaluation and a focus on individual incentives are necessary to ensure both parties increase their focus on improving the needs of the shipper. In other words, the gainsharing pricing model loses it characteristic traits and becomes a new, visible and trusted pricing model.

This would mean that incentive alignment is another necessary condition for supply chain collaboration but the incentive will need to be mitigated with trust and commitments from supply chain members in order to achieve collaboration and eventually resilience in supply chains. It is observed that even though this section discussed new technology, gain-sharing, vested outsourcing and logistics alliances, the key drivers of supply chain collaboration that remain necessary for the successful implementation are information sharing, trust and incentive alignment.

Public Private Collaboration: An humanitarian example

Humanitarian relief has been the focus for many supply chain researchers (Van Wassenhove, 2006; Oloruntoba and Gray, 2006; Pettit and Beresford 2009; Maon et al., 2009). Literature shows that firm's SCM principles can be well applied in the humanitarian context, which is often referred to as humanitarian supply chains. Important contributions from the literature are the types of disasters (Van Wassenhove, 2006), stages of humanitarian relief processes (Kovács and Spens, 2009), coordination and collaboration in humanitarian supply chains (Pettit and Beresford 2009; Akhtar et al., 2012).

The difference between a firm's supply chain and the humanitarian supply chains is that the latter is more unstable (Oloruntoba and Kovács, 2015) and unpredictable (Van Wassenhove, 2006) and therefore more collaboration is needed. This has enhanced the challenge of the management of humanitarian supply chains. Kunz and Reiner (2012) indicated that the consequences of a disaster require many actors and the response to a disaster should not take too long. Pettit and Beresford (2009) and Akhtar et al. (2012) also argued that humanitarian supply chains need better coordination, cooperation, and collaboration.

In the humanitarian relief context, Johnson et al., (2011) stated that a firms'strategy should focus more on collaboration, not only within internally and among firms' supply chain partners but also with public agencies to increase efficiency and effectiveness in disaster response. At the operational level, researchers have suggested that it is important to investigate how firms select and fund relief organisations, how they select disaster causes and target beneficiaries, how they operate their programs and collaborate with other firms (Johnson et al., 2011; Gautier and Pache, 2015).

Stakeholders in humanitarian supply chains

Kovács and Spens (2007) provided a broad view of actors grouping based on involvement level in relief operations. They indicated that a regional perspective consisted of local governments, military, local firms, and regional relief agencies, while an extra-regional perspective consisted of international actors such as the United Nations, larger relief agencies, other extra-regional NGOs and logistics providers. Global and local relief agencies are primary actors in humanitarian supply chains who receive funding from donors that could either be individuals, private firms or government (Kovács and Spens, 2007; Oloruntoba and Kovács, 2015).

For several years, humanitarian supply chains have adopted a participatory approach. This method allows local communities to collaborate in the design and the development of humanitarian relief plan processes (Barry and Barham, 2012; Brown et al., 2014). Participation and collaboration of community leaders and their local communities can help humanitarian relief operations more efficiently by mitigating several difficulties such as cultural exclusions, trust in the relief agencies, managing the expectations of the local community, and offering relief agencies with local knowledge (Barry and Barham, 2012). Many firms have implemented their humanitarian relief programs through local communities and local leaders, for example, a company trained community leaders and local people on preparing and responding to disasters (Johnson et al., 2011). This collaborative approach strategy has a direct impact on humanitarian supply chain performance but the type of impact this approach has on the design of humanitarian supply chains is still under researched (Oloruntoba and Kovács, 2015).

Collaboration among supply chain members

Researchers have suggested that firms may have long-term collaboration with relief agencies through strategic partnerships in which they share skills and knowledge to help relief agencies in developing and implementing humanitarian relief programs (Maon et al., 2009; Balcik et al., 2010). Thomas and Fritz (2006) suggested that the establishment of a partnership between firms and relief organisations before a disaster occurs can help relief efforts become more effective. The collaborations between these actors usually create a win-win outcome. NGOs need resources and more effective relief management and firms desire to legitimise their activities as both parties ultimately help relief beneficiaries from disasters (Thomas and Fritz, 2006; Maon et al., 2009).

Maon et al. (2009) offers three perspectives: (1) financial, (2) capability, and (3) entanglement. These three perspectives can explain how the collaboration between firms and relief agencies can help to improve humanitarian supply chains. As relief organisations engage more with the private sector, their capabilities are increased as they can access firms' resources such as infrastructure and knowledge, and can improve relief efficiency and effectiveness. In the entanglement perspective, a firm may have a long-term commitment to provide its resources and help manage disasters with relief agencies. Austin (2000) suggested strategic collaboration stages between firms and NPOs based on the nature of the relationship as described in Table 2. The higher the level the more intense the relationship is.

Table 2. Strategic collaboration continuum of firms and NPOs relationship

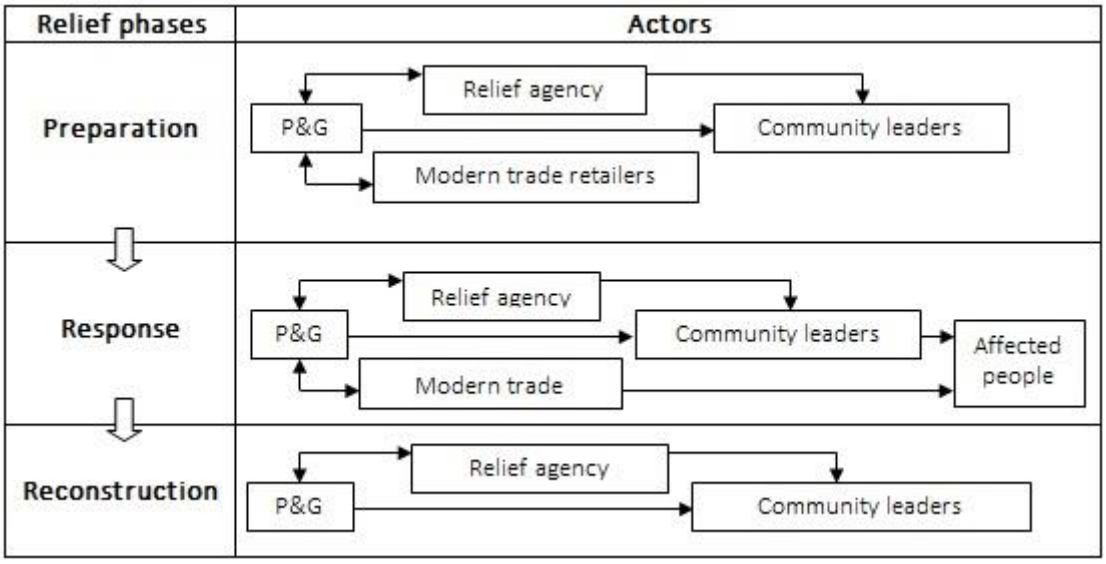
Nature of Relationship	Stage I (Philanthropic)	Stage II (Transactional)	Stage III (Collaborative)
Level of engagement	Low	⇨ ⇨ ⇨	High
Importance to mission	Peripheral	⇨ ⇨ ⇨	Central
Magnitude of resources	Small	⇨ ⇨ ⇨	Big
Scope of activities	Narrow	⇨ ⇨ ⇨	Broad
Interaction level	Infrequent	⇨ ⇨ ⇨	Intensive
Managerial complexity	Simple	⇨ ⇨ ⇨	Complex
Strategic value	Minor	⇨ ⇨ ⇨	Major

Source: Adapted from Austin (2000)

Collaboration in order to achieve resilience and responsiveness is a key issue in disaster relief. Aid should arrive in time, in the right place, and in the right condition to beneficiaries (Banomyong and Sopadang, 2010). However, the correct relief activities might not reach targeted recipients. The relief programs might not meet the requirements of the affected areas with only minimal collaboration between suppliers (Oloruntoba and Gray, 2006). Researchers have stated that there was a need for better coordination, cooperation, and collaboration among actors in humanitarian supply chains (Pettit and Beresford 2009; Maon et al., 2009; Akhtar et al., 2012). Maon et al., (2009) further suggested that determining how these different actors work together and how partnerships need to be built on trust and collaboration is important.

Procter and Gamble (P&G) (Thailand) was involved in the 2011 Thailand flood by donating water purifier to help people affected by the flood through a relief organization (CSDW, 2011). This case is chosen as an illustrative case on how public-private collaboration can enhance resiliency.

Figure 2. Supply Chain Members' Role in Procter and Gamble 2011 Thailand flood humanitarian relief



Source: Banomyong and Julagasigorn (2017)

P&G participated in the 2011 Thailand flood by donating and distributing water purifier packets to the affected people through a relief agency, the Princess Pa Foundation under the Thai Red Cross Society (hereafter "Princess Pa Foundation"). The foundation collaborated with P&G and enabled the company to access the affected community and distribute an estimated two million water purifier packets to people who suffered from the flood. The Princess Pa Foundation is a non-profit humanitarian organisation operating under the Thai Red Cross Society, a major humanitarian relief organisation in Thailand. Its main objectives are to support and complement other actors in humanitarian relief actions as well as to supply drinking water to those suffered from a severe flood disaster (Princess Pa Foundation, 2004).

With the help from the Princess Pa Foundation and the Thai Red Cross, community leaders who lived in the flooded area were identified. Community leaders played an important role in coordinating with P&G and the foundation in humanitarian relief efforts. They had the best knowledge related to the need of their communities, knew where and when to use water purifier packets, and helped other actors to coordinate with the people under their charge. P&G connected and established relationships with these community leaders through the foundation's network.

P&G took the initiative to provide knowledge and train volunteers of the Princess Pa Foundation and the Thai Red Cross Society on the proper use of P&G water purification packets. Consequently, these volunteers were able to train the community leaders who played a critical role in storing and distributing water purifier packets as well as training and convincing villagers to use the product in the correct way.

Modern trade retailers acted as distributors of the packets during the flood. They had an important role in the preparation and response phase. These six retailers were Tesco, 7-11, Big-C, Tops, Foodland, and

the Mall group. They are all P&G key customers in Thailand. In a normal situation, in a commercial relationship, P&G sell its products to the retailers who distribute and sell P&G's products to consumers. On top of this commercial relationship, the Customer Business Development team of P&G and procurement team as well as key managers from the retailers interacted to work continuously in improving collaboration, service level, supply chain performance, and key promotion activities. This is of benefit to both parties, and raised the relationship level in the supply chain.

During the flood, P&G exercised its strong collaboration with retailers by engaging them to help consumers who were affected by the flood. P&G leveraged the retailers' core competency by using their stores located nearby flooded areas to store water purifier packets and distribute the product to the affected people.

Leveraging the competencies of supply chain members

The case study above shows that if a firm wants its collaboration strategy to become successful in the humanitarian relief contexts, it has to consider the role of the other actors. The firm needs to think about how it can utilise others actors' core competencies to support its supply chain objectives. In this case, the relief agency, community leaders, and modern trade retailers were parts of the success of the P&G's relief supply chain.

Firms and relief agencies can take advantages of each other's core competencies to deliver better relief efforts (Thomas and Fritz, 2006). As suggested in the literature above, a relief agency played a critical role in this humanitarian supply chain. Together with P&G, both parties participated in all phases but mostly in the preparation and response phases. In the case of P&G where customers in humanitarian supply chains were the people affected by the flood, they knew where the product came from as well as who came to help them to relieve their suffering. This might positively affect a firm's reputation as their in-kind donation towards disaster relief activities could produce reputations and competitive advantage through stakeholders' attention. P&G donated its product through the Princess Pa foundation that is considered to hold a neutral position as a non-profit organisation.

Collaborating with actors such as local people, local governments, and local businesses in the disaster planning process is important, and these actors will play a major role in response and recovery phases (Brown et al., 2014; Oloruntoba and Kovács, 2015). Based on the Thailand Flood case study, which is consistent with the literature, the community leaders were key stakeholders in all the phases as they helped connect all involved in the relief effort. Empowering local leaders and engaging them in the relief phases helped relief activities become more efficient as these people have the authority to talk with their people and the respect in balancing benefits between relief agencies and their people (Barry and Barham, 2012). Hence, community leaders were the key intermediaries between not only the affected people and the relief agencies but also the firm. They helped P&G in storing the product and convincing their people to use the product when the emergency occurred.

Previous studies have suggested the important role retailers play in distributing supplies for humanitarian relief efforts. Regional retailers can play an important role in distributing supplies in disaster areas (Kovács and Spens, 2007). They are the coordinator at the last mile nodes in humanitarian relief efforts (Sodhi and Tang, 2014). Banomyong et al., (2009) stated that retailers could support relief actors by providing their capabilities to access and distribute relief supplies to local people in affected areas where their stores were also located. Retailer logistics networks are usually high performing and therefore and with these strengths, responsiveness in humanitarian relief efforts can become more

effective. As shown in this case, P&G used the modern trade retailers' logistics capabilities in distributing its product to several flooded areas.

Collaboration mechanisms and key success factors

This section presents the coordination mechanisms for collaboration in each phase of disaster relief.

Preparedness phase

Figure 3 shows how P&G executed its collaboration strategy in the preparedness phase. The firm initially worked with the Thai government and Princess Pa Foundation to identify flood-prone provinces such as Chiang Mai, Uttaradit, and Nakhon Si Thammarat and their community leaders. Instead of using the usual central storage locations of the Thai Red Cross and other military areas, which would increase the transit time to reach the targeted communities, the company donated the water purifier packets to Princess Pa foundation to be stored and then distributed with a survival kit to community leaders. About one month before the flood, P&G communication team and a representative from the foundation trained one hundred community leaders in each flood-prone province who in turn had to further train their villagers on how to use the product, follow-up to ensure the proper use, and to liaise with the foundation concerning ongoing supply and demand. Community leaders were also required to store some packets at their home to prepare for distribution. During this phase, P&G did not actively engage with its retailers much. There was no established contract with them to store the packets at retailers' stores in the high-risk areas. Instead, P&G continually strengthened their supply chain collaboration level through commercial and non-commercial activities.

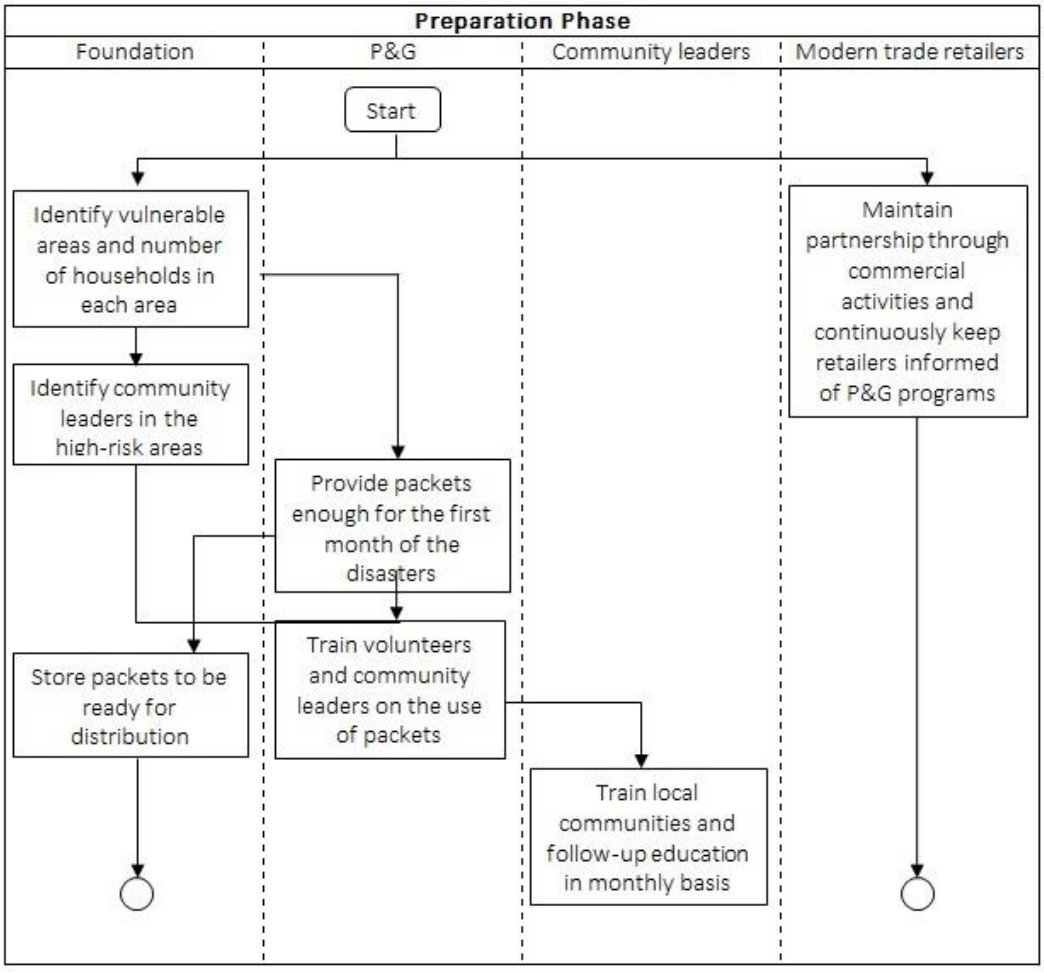
Three key success factors in the preparedness phase were identified that helped P&G's collaboration strategy become successful:

(1) Working with the Princess Pa foundation allowed P&G to reach the affected communities and enabled it to execute its program directly with affected people.

(2) Identifying the community leaders in the flood-prone areas as well as training those community leaders.

(3) Use of community leaders to convince affected people to cooperate on relief efforts.

Figure 3. Collaboration requirement in preparedness phase



Source: Banomyong and Julagasigorn (2017)

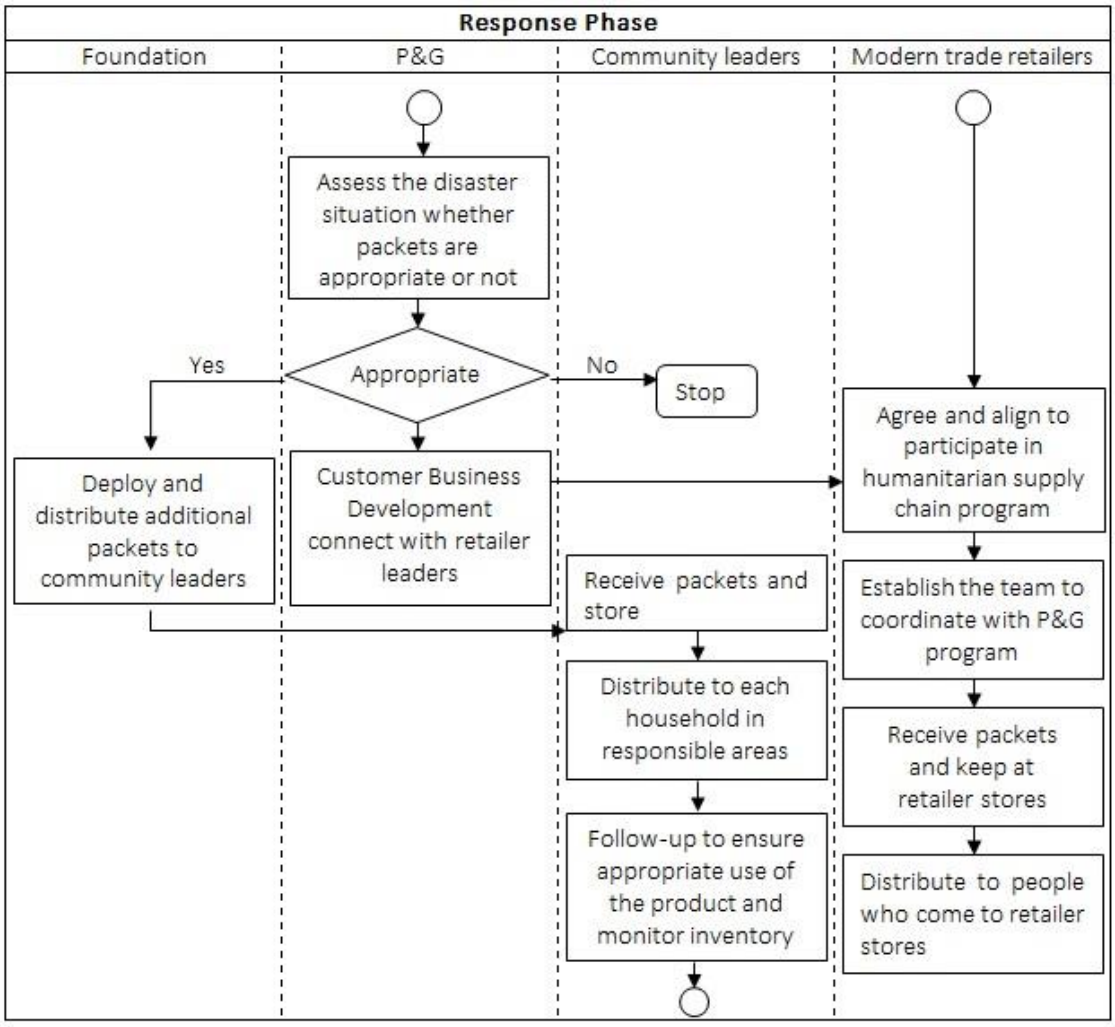
Response phase

As the flood occurred, P&G considered whether the distribution of packets was appropriate or not. The company assessed the water quality level such as the availability of drinking water sources and water quality in the flood areas, the readiness of target communities if they had well-trained people who were capable of using the product, and the availability of materials such as water buckets and cotton filters for making the clean water. Packets attached with a Thai language instruction were distributed from the trained community leaders. Afterward, these community leaders together with the P&G communication team and foundation volunteers followed-up with households to ensure the appropriate use of the packets. According to the established partnership with the retailers, P&G representatives reached out to the managers of those retailers. During this phase, the Customer Business Development team asked for commitment from the retailers to help in the flood relief. Leveraging the retailers' core competencies of having retail stores across countries, one million packets were stored and distributed from several retailer stores operating nearby to the flooded areas.

This case illustrates that working with community leaders was the key success factor in this phase as they were the key informers who reported situations related to their communities together with the

representatives of the relief agencies and P&G who communicated and followed up on the proper use of the product in the affected communities. The efficient retailer logistics system was another key success factor as it helped in the distribution of packets to the affected people.

Figure 4. Collaboration in the response phase

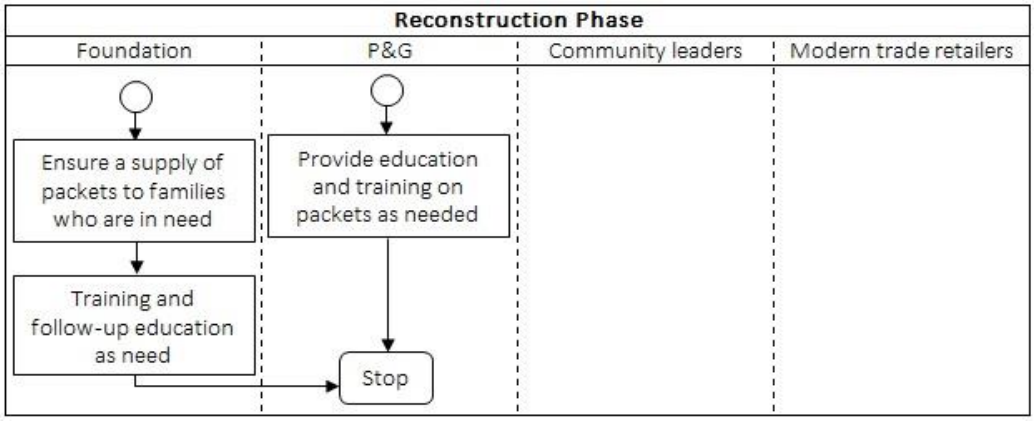


Source: Banomyong and Julagasigorn (2017)

Reconstruction phase

After the flood (Figure 5), the foundation maintained its connection with community leaders to ensure sufficient supply of the product and the proper use of the packets by regularly assessing and using a questionnaire for the community follow-up. P&G continually connected closely with the foundation to provide knowledge and training on how to use the product as needed. In the reconstruction phase, knowing the requirements and meeting them was the key success factor for P&G in executing its collaborative strategy. As the company followed up its performance, future relief plans and execution could therefore be more effective with the lessons learned from the past event.

Figure 5. Collaboration in the reconstruction phase



Source: Banomyong and Julagasigorn (2017)

Collaboration assessment

Based on research by Austin (2000), the collaboration relationship between P&G and the foundation can be illustrated as in Figure 6. Interactions and management in each phase were complex and intensive. Hence, the author would like to note that P&G had an integrative collaborative relationship with the foundation to provide relief operations through the design of a resilient supply chain.

Figure 6. Collaboration framework in humanitarian relief

Steps			Tools
Identify a company's products or services that are appropriate for disaster relief as well as relief agencies who respond to the disaster			⇨ Types of disaster
Identify the phases of disaster relief that the company can possibly deploy			⇨ Phases of disaster relief
Action plan			
Phase	Preparation	Response	Reconstruction
Key actors	A company Relief agencies Community leaders Retail companies	A company Relief agencies Community leaders Retail companies Target communities	A company Relief agencies Community leaders
Overall key success factors	Participatory approach Responsiveness Trust among actors Supply Chain Collaboration		
Key success factors according to the phase	• Working with relief agencies • Identifying community leaders • Training volunteers and community leaders	• Working with community leaders • Retailer logistics system	• Know and meet the requirements • Performance measurement

Source: Banomyong and Julagasigorn (2017)

Conclusions

Collaboration between supply chain members is critical for the improvement of its performance and competitiveness. The link between supply chain collaboration and resilience has yet to be fully explored. Nonetheless there are already clear benefits of collaboration in relation to resilience. Defining the scope of collaboration is important as a framework is needed to explain the drivers of collaboration.

In order to achieve collaboration in supply chains, members need to trust each other. This is one of the biggest hurdles and often due to differences in bargaining power. Members with less bargaining power tend not to trust those with stronger power. The win-win situation needs to be demonstrated by the member with stronger bargaining power who are often referred to as the "focal" firm in a supply chain.

However, having trust is not sufficient. There is a need for commitment between supply chain members. The members need to commit to their supply chain in order to enhance its performance and competitiveness. Commitment is even more important in the case of resilience as all supply chain members will need to work together in order to restore the supply chain to its original state thus investing in resources that might be limited after a disruption.

Decision synchronisation is the next driver of collaboration. Collaboration does not mean joint decision-making but it is important that decisions taken by supply chain members are synchronised in order to enable a supply chain to respond quickly to any changes or disruption. Responsiveness is a key output of decision synchronisation and enables supply chains to be more resilient because of the enhanced response speed.

An interesting driver of collaboration is incentive alignment. It is true that having common goals and incentives are helpful in the development of collaborative relationships but their modalities will need to be defined beforehand if they are to be successful. Gainsharing or vested outsourcing are illustrations of such incentive alignment but do not mean that there is collaboration between supply chain members.

Information sharing is a prerequisite for supply chain collaboration. With the advent of the digital economy there are currently numerous online crowd shipping platforms that links and share information between shippers, consignees and service providers. However, it remains to be seen if collaboration does occur for just sharing and matching information. Information sharing is needed but it does not mean supply chain collaboration as the other drivers such as trust and commitment are needed to make supply collaboration a reality.

In order to achieve supply chain resilience during or after a disruption, collaboration cannot solely be between direct supply chain members. The need to involve state agencies and NGOs in the supply chain is apparent as not all can be done by direct supply chain members. A road that is flooded will need the support of external agencies for its rehabilitation. The illustrative example of public and private collaboration shows the key role played by not for profit organisations in providing relief to affected populations.

Notes

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3 https://web.archive.org/web/20140706101452/http://www.myclouddoor.com/web/documents/The%20New%20Digital%20Economy.pdf (accessed February10, 2018)

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