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Citation for final published version:

Sanchez Rodrigues, Vasco ORCID: <https://orcid.org/0000-0003-3375-3079>, Harris, Irina ORCID: <https://orcid.org/0000-0003-0622-5123> and Mason, Robert ORCID: <https://orcid.org/0000-0001-9089-2521> 2015. Horizontal logistics collaboration for enhanced supply chain performance: an international retail perspective. Supply Chain Management 20 (6) , pp. 631-647. 10.1108/SCM-06-2015-0218 file

Publishers page: <http://dx.doi.org/10.1108/SCM-06-2015-0218>
<<http://dx.doi.org/10.1108/SCM-06-2015-0218>>

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Horizontal Logistics Collaboration for Enhanced Supply Chain Performance

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ABSTRACT

Purpose – Horizontal logistics collaboration (HLC) initiatives can fail. To improve the chance of success a thorough consideration of the potential issues involved, such as seeking supply chain partners' support, ensuring access to information / data security and assessing whether a HLC model could bring improvements to a wide range of supply chain metrics rather than reductions in distribution costs only, needs to be understood before deciding to proceed with such an initiative. To support this, the paper aims to develop a supply chain-driven model for HLC.

Design Methodology and Approach - A two-stage methodology is deployed. As part of Stage 1, a series of 20 semi-structured interviews with senior managers from retailers, retailers' suppliers and logistics service providers were undertaken. Subsequently, in Stage 2, a focus group with practitioners from retailers and logistics service providers was run to verify the findings gathered during Stage 1. Four elements of a new HLC project being considered are investigated by supply chain champions across the UK Fast Moving Consumer Goods industry, namely consideration factors, required synergies, enablers, and anticipated output metrics.

Findings - When considering whether or not to embark on a HLC project, the supply chain requirements need to be taken into account and potential supply chain performance benefits projected. The paper identified several consideration factors; synergies and enablers that support the development of HLC projects are identified, such as legislation, trust among partners, common suppliers and delivery bases, capable 3PL and an effective commercial model, including a fair sharing of benefits.

Research Limitations and Implications – The research provides new understanding in accounting for the needs of the supply chain when considering a HLC initiative involving leading players from the retail sector.

Practical Implications - The importance of taking a supply chain approach when evaluating the feasibility of HLC is demonstrated. HLC arrangements among competing supply chains need to be designed and run by taking account of all supply chain partners, namely suppliers, 3PLs and customers (in this case, retailers).

Originality and Value - The contribution is threefold: i) identification of outset consideration factors, ideal required synergies, actioning enablers and wider supply chain metrics of HLC; ii) development of a supply chain-driven model for HLC, which includes in the decision-making whether or not to adopt a horizontal logistics collaboration model, wide supply chain metrics such as stock levels of finished products and shelf availability, inventory, working and fixed capital, and product waste in addition to distribution costs; and, iii) the proposal of a new definition for HLC which challenges published definitions.

Keywords: Horizontal Collaboration, Logistics Management, SCM metrics and Retailers

1. Introduction

The organisation and provision of logistics is becoming an increasingly critical primary activity in modern supply chains due to growth in trade, particularly international trade, more complex chains of supply, and a desire to reduce the unwanted externalities associated with freight storage and movement. As part of this quest, the selection of an appropriate design of logistics network represents a key decision, as the commonly agreed objective of logistics management is to design or configure the logistics network so as to minimise system-wide cost subject to a variety of service level requirements (Bramel and Simchi Levi, 1997). One answer, which has been developed in particular over the last twenty-five years or so, is the strategic deployment of more efficient and effective integrated vertical supply chains (Power, 2005). By taking this supply chain management (SCM) approach, many organisational entities have enhanced the competitive performance of their supply chains through improved logistics performance (Stank et al. 2001). Beyond this, several studies have investigated different opportunities for further performance improvements for logistics provision, including cooperation, collaboration, alliances and joint ventures through developing integrated horizontal links with operators at the same level of the supply chain (e.g. Cruijssen, et al., 2007a, Mason et al., 2007 and Hingley et al., 2011). This research paper focuses on one example of this, horizontal logistics collaboration (HLC), which can be defined as “bundling transport of companies operating on the same level of the supply chain, who have similar or complementary transportation needs” (Vanovermeire et al., 2014). Whilst transport is clearly a key component of logistics, our research envisages HLC can occur on all logistics activities including, for instance, warehousing etc.

Today, HLC is seen as an increasingly viable strategy for improving logistics performance and thus the performance of the associated supply chains that logistics serve (Hingley et al., 2015). HLC is one form of horizontal coordination in logistics. However, horizontal coordination occurs at tactical levels when shippers react to inefficiencies in the fill rate of vehicles, and as a result, they coordinate their distribution flows to increase the overall utilisation of vehicles. HLC can also occur at strategic levels when shippers share a common distribution planning platform and can better optimise their supply chains and logistics networks. This is a well-established working practice in air and sea based logistics, but is not, as yet, a common characteristic of road freight logistics (Cruijssen et al., 2007a). An interesting point to reflect on at this stage is the almost casual manner in which the words collaboration and coordination are invariably interchangeably used in this context. Cruijssen et al. (2007b) reviewed this, arguing that, despite the ambiguity that existed, there should be a clear discriminatory line drawn between the two terms, citing Mentzer et al. (2000) and Golicic et al. (2003) who felt collaboration involves much more than coordination and includes sharing of risks, knowledge and profits through a closer relation than would exist in

cooperation. The issue centres around the definition of the two terms, with cooperation often appearing as an umbrella term covering many types of inter-organisational relationship from the almost transactional at one extreme to almost a joint venture at the other, which Cruijssen et al. (2007b) concluded upon, inspired by Lambert et al. (1999). HLC can thus be envisaged as one form of the wider horizontal logistics coordination concept.

The literature on HLC in land-based logistics is still very much in its infancy (Leitner et al. 2011; Pomponi et al. 2015). There remain plenty of areas where better understanding is required both for academics, examining the issues and underpinning theories, and practitioners. In particular, much of the research in this area has either been conceptual or has had a narrow road freight transport focus (Mason et al. 2007; Lehoux et al. 2009; Nagurney, 2009; Ballot and Fontane, 2010; Daugherty 2011; Cruijssen et al., 2007a).

This paper seeks to contribute to addressing this gap and aims to develop a supply chain-driven model for HLC. It incorporates a wide set of internal metrics which go well beyond mere costs, include externality outputs, and take into account values from actors along the supply chain, such as the supplier and customer. It builds on Mason et al.'s (2007) research, which envisages that HLC initiatives should benefit the supply chains they operate within. The study explores the steps supply chain champions, the senior practitioners in charge of supply chain improvement programmes in the organisation, should consider when they contemplate launching a new HLC project. The UK Fast Moving Consumer Goods (FMCG) sector is chosen as a setting for the research, focussing on their international pan-European logistics networks. This sector is one of the leading innovators in supply chain and logistics practice, including the development of HLC (Hingley et al., 2011 and 2015, Vanovermeire et al., 2014), and pan-regional logistics elevates the significance of logistics in terms of the distances involved.

This study proposes a supply chain-driven model for HLC based on a two-stage methodology. Four phases of a potentially new HLC project being considered by supply chain champions across the UK FMCG industry are investigated; namely, outset consideration factors, ideal synergies, assisting enablers, and output metrics. Following this introduction, section 2 discusses the literature in inter-organisational collaboration within and beyond the supply chain. The methodology is presented in section 3. Sections 4 and 5 discuss the results and develop the supply chain-driven model for HLC. The paper concludes with the implications of the study for the theory and practice of logistics.

2. Inter-company collaboration within and beyond the supply chain

Collaboration is one business strategy that has been explored widely in the literature. Several studies have been presented in business areas such as financial management, R&D, procurement and supply chain management and logistics. Inter-organisational collaboration can essentially be categorised into two types: vertical collaboration up and down the chain of supply, or horizontal collaboration between actors who are performing at the same level of the chain of supply (Barratt, 2004).

The vast majority of research has focused on the relatively more simplistic, vertical inter-company collaboration arrangements, up and down the supply chain. Numerous authors have demonstrated the benefits of vertical integration within a supply chain (for example, Lee & Billington, 1992; Cox, 1999; Fawcett & Magnan, 2002; Frankel et al., 2002; Simatupang & Sridharan, 2004; Bagchi et al, 2005; Min et al, 2005). The adoption of a collaborative supply chain strategy has many challenges. These include overcoming the classical, functionally divided organisation or devising

ways to reduce the vulnerability of the whole supply chain, which can be affected by the opportunistic behaviour of individual players (Simatupang and Sridharan, 2002, Skjøtt-Larsen et al., 2003 and Fawcett et al., 2008). Barratt (2004) also outlines a number of potential barriers, which could generate uncertainty and thus act as fundamental causes of failed collaborative initiatives. For collaboration to work, a medium to long term collaborative culture needs to be set up, supported by trust, exchange of information, often resources and, importantly, on-going senior management support (Lindgreen et al, 2009).

While most of the research on vertical collaboration has focused on arrangements between the supplier and the customer of products, there is also a body of literature that has focused on vertical collaborative relationships involving logistics provision. Logistics provision has been one of the most popular activities to be outsourced to third parties over recent decades (Hertz and Alfredsson, 2003) and when a different firm undertakes an activity, one of the key issues surrounds what kind of inter-organisational relationship should be formed. Macneil (1980) envisages a continuum in this regard from purely transactional to purely relational exchanges between buyers and sellers.

Whipple and Frankel (2000) noted that the delivery process within supply chains had become a more integral part of the manufacturer's product offering, and thus logistics activities within supply chains need to be designed, run and planned by taking a partnering orientation. Ostrom et al. (2010) agreed, stating that service companies, e.g. logistics service providers, tend to seek to develop closer relationships with their customers. However, in reality in logistics, there is an almost equal split between transactional and more collaborative arrangements between shippers and providers (McIlraith, 1998 cited in Hingley et al., 2011). Despite the provision of logistics being a vital component of the modern chain of supply, there is often reluctance on the part of the shipper to work with the provider on a mutually collaborative basis. Often logistics is seen more as a commoditised service by shippers, where the most important component of value is a low price and the service requirements, although invariably quite exacting, are taken as a given. Bask (2001) proposed that to resolve this issue the type of inter-organisational relationship involving logistics with the shipper should be aligned to the complexity of service.

Logistics providers, as the link provider between the product seller and buyer, are integral cogs in the chain of supply and thus act as crucial supporters and even facilitators of modern SCM (Skjøtt-Larsen, 2000, Mason and Lalwani, 2006, Stefansson, 2006 and Naim et al, 2006) and provide value for the supply chains they serve. However, the providers of logistics and their shipper customers are increasingly realising that there are still many wastes in their operations if they are left to operate in a completely dedicated form to the specific supply chains they serve. This is leading to a renewed focus for them to consider what, in addition to vertical collaboration, can be gained by coordinating logistics activities in support of one chain with other parallel chains of supply. Horizontal coordination, often through HLC, even on occasion with competitors (Bengtsson and Kock, 2000), where assets in logistics, such as a truck or a warehouse are positioned to serve numerous parallel supply chains and not exclusively focused on one supply chain, is becoming an attractive area to explore and exploit. Simatupang and Sridharan (2002) suggested that vertical and horizontal collaboration could both be used by organisations simultaneously in what they termed as "lateral collaboration". Some leading logistics providers are therefore juggling vertical and horizontal inter-organisational relations at the same time (Caputo and Minimo, 1996 and Mason et al, 2007).

There are many gains that can be realised by developing horizontal coordination and HLC in land-based freight logistics. Fernie and McKinnon (2003) report on efficiency improvements when manufacturers worked together on primary distribution but Cruijssen, et al. (2007a) propose three categories for horizontal coordination benefits: “costs and productivity benefits, service benefits and market position benefits”. Mason et al. (2007) largely concur with this potential multi-benefit effect, categorising them as benefits of “efficiency, asset utilisation and customer response”. Building on these papers, a number of authors have demonstrated the range of benefits horizontal coordination can provide (see for example, Daugherty, 2011) while Pomponi et al. (2015) provided an analysis of the aims of HLC as argued in seven leading research papers in the field and found that each cited cost reduction as a benefit, whilst customer service, increased responsiveness, social relevance (especially environmental issues), value creation, improved productivity, growth, innovation, improved market position, better resource management, reduced supply risk and networking were each cited by at least two of the studies.

Cost benefits are thus seen as a key benefit of horizontal coordination and HLC and can usually be developed by combining volumes from parallel supply chains and gaining size economies from this (Cruijssen, et al., 2007; Mason et al., 2007). This allows for more intensive use of assets, such as trucks or warehouses. For instance, a better use of the trailer cube can be achieved by combining high volume, less dense shipments with denser, lower volume products, rather than moving them separately. Empty backhauls can also be reduced or eliminated. It is also possible to reduce operational support, consumable and non-core costs by sharing them between organisations. For instance, training, fuelling arrangements, purchasing of vehicles can benefit from joint provision or procurement. More frequent deliveries also mean that inventory levels can be lowered.

On the service side, horizontal logistics strategies can facilitate more frequent deliveries and allow for wider geographic areas to be justifiably covered (Cruijssen, et al., 2007a; Mason et al., 2007). Logistics providers can join together to tender for contracts that, on their own, they would be unable to consider. The higher volumes generated through linking parallel supply chains can also enable more frequent deliveries. From shippers’ perspectives, this permits lower inventory levels to be maintained and speedier recovery from any sell outs which may occur. Flexibility improvements can also be created (Vanovermeire et al., 2014). Finally, horizontal coordination also has external benefits, such as allowing for lowering of emission rates through a more intensive use of assets.

There is also a range of recognised impediments, or barriers, to HLC. Again Cruijssen et al. (2007a) were instrumental in identifying a number of these, categorised under the headings of “partner selection problems, determining and dividing the gains, the unequal negotiating positions of partners and the uneven adoption of information communication technology solutions among logistics providers”. Krajewska (2008) confirmed much of this list, citing partner identification and selection, how inputs and outputs can be divided up fairly under what has been termed as the gain-share problem, as the key barriers. A further concern includes the deployment of ICT in HLC arrangements, which can also be a major stumbling block in terms of uneven standards and protocols used, leading to incompatibility difficulties.

Wallenburg and Raue (2011) pick up on some of these identified barriers, arguing that there are inherent governance issues surrounding HLC that can lead to real problems of conflict. This largely stems from the natural high levels of complexity in HLC (Schmoltzi and Wallenberg, 2009). Thus, they argue, considerable effort needs to be directed towards making such arrangements functional and fit for purpose. Wallenburg and Raue (2011) take the view that “compared to vertical

cooperations, higher potential for opportunism and dysfunctional conflicts emerges as partnering firms are competing for the same customers”.

Although there have been specific sectoral studies investigating HLC in logistics (Hingley et al., 2011) the empirical research in this area is lacking. A number of authors present conceptual frameworks to guide future research in the topic of HLC. Mason et al. (2007) showed that new innovative solutions, based on enhanced inter-organisational collaboration, had been developed for better transport optimisation and these solutions could improve the competitiveness and performance of logistics networks. Lehoux et al. (2009) stated that collaborative logistics could lead to improved cost and CO₂ efficiency of freight transport networks and Pomponi et al. (2014) used mutual trust between partners and the extent of the cooperation.

The role of a facilitator for HLC is often advocated by research in this area. Most notably, Hingley et al. (2011, 2015) argue that in the grocery sector a 4PL may be required to coordinate the actors involved and bring them together to realise the benefits that can accrue from a successful HLC project.

Beyond the issues already identified for research, two significant structural concerns emerge for investigation: is HLC and horizontal coordination in logistics solely a concern of the providers – i.e. should suppliers and customers of products in the supply chain also be involved with this practice? Secondly, how can the optimisation of both vertical and horizontal coordination be best managed together? Moreover, the literature on the impediments to HLC and horizontal coordination in logistics is largely considered from the perspective of the provider rather than the shipper. From the shipper's point of view, little has been studied in research papers around the subject of the challenges faced from the shippers view if horizontal strategies are pursued. In addition, does HLC have to occur exclusively between providers of logistics: can shippers themselves enter into HLC together in efforts to better manage the logistics operations that jointly serve them?

Finally, recent publications in HLC have mainly investigated nationally based networks with a predominant emphasis on HLC opportunities among manufacturers rather than retailers (IGD, 2012; ECR France, 2012; Verstrepen, 2013). There is a valid argument, applicable to international logistics networks, that the lengthier the delivery distance and the further the supplier is from the secondary distribution centres, the more standard and generic the distribution of freight must be. Chang (2008) demonstrates quantitatively the importance of volume, delivery distance and transportation economies of scale in the consolidation of freight in a given transport mode. This also applies to primary transport flows located internationally, since the decoupling point in logistics networks, particularly in FMCG sectors, is located at the point of consolidation in secondary distribution centres at the country where the grocery retail stores are (Ferne and Staines, 2001; Fernie et al., 2010; Sanchez Rodrigues and Potter, 2013). Cross-trade freight movement is also a booming segment in the EU, having grown by 80% between 2004 and 2012 (European Commission, 2014). Research on HLC has also ignored the strategic role international consolidation centres, which can be positioned at close proximity to the country where stores are located, might play at improving the efficiency and supply chain responsiveness of HLC networks. The research in this project aims to contribute to countering these gaps by focusing on pan-European logistics, with the possibility of improved consolidation as a theme included in the study.

In summary, there is significantly more interest in HLC, but, whilst there are many attractive benefits that can be gleaned, there are also significant hurdles to be considered and overcome, as

it is a highly complex concept. As significant effort and time needs to be placed at the outset of any new HLC scheme to ensure many of these issues have been properly appraised and acted upon, research investigating the nature of these issues could have considerable benefit. This is what this study intends to achieve by identifying more clearly the potential supply chain demands of HLC projects in any given context and developing a fuller systematic understanding of the issues that need to be considered by supply chain leaders who are contemplating embarking on a HLC project as a potential improvement initiative. The four questions that will drive the study are:

- What should be considered before supply chain champions embark on a HLC project?
- What enablers can be worked on to improve the chance of the HLC project being positive?
- What benefits can be obtained from a HLC project?
- How can the changes in performance from a HLC project be measured?

3. Methodology

This research presents a multi-stage qualitative study, which takes a network perspective to examine horizontal logistics collaboration. The supply chain is taken as the main decision-making driver. In addition to typical logistics elements such as freight transport, wide supply chain metrics, e.g. stock levels of finished products close to the market, product availability, inventory, fixed and working capital, and product waste are considered in evaluating the feasibility of HLC. In particular, this study intends to identify and examine the main consideration factors, ideal synergies, assisting enablers and output metrics that could influence the performance of HLC.

For the study, a Delphi study approach was chosen to evaluate experts' perspectives from an exemplar UK sector, the grocery retail sector. The focus was to examine the feasibility of the adoption of horizontal collaboration in the international primary distribution operations of grocery retail products from initial considerations to expected outcomes. The Delphi study approach has been used by several researchers (Akkermans, 1999; MacCarthy and Atthirawong, 2003; Bagchi et al., 2005; Piecyk and McKinnon, 2010; von de Gratch and Darkow, 2010). The research problems investigated by these researchers examine future changes to a range of aspects in logistics and supply chain management. In particular, Akkermans (1999), MacCarthy and Atthirawong (2003), von de Gratch and Darkow (2010) adopted a qualitative Delphi study approach interrogating panels of experts relevant to the specific research problems of focus. Experts in the context of the international primary distribution of UK imports of grocery retail products participated in the Delphi study, including several senior managers from retailers, suppliers and LSPs.

Figure 1 shows the methodological path followed in the research. Two methods of data collection were used, namely semi-structured interviews and a focus group. In summary, the research was run in two stages with the aim of achieving a high level of data confirmation in the process. In Stage 1, 19 semi-structured interviews were run to explore the experts' views on the feasibility of horizontal collaboration in the context of Europe-UK retail logistics networks. In Stage 2, a Focus Group was conducted with representatives from the interviews to verify the findings from Stage 1. Participants included retailers, LSPs and manufacturers that supplied products to retailers.



Figure 1. Methodological path of the research undertaken

The UK retail sector was chosen because it represents a significant sector in its own right, being valued at over £300 billion to the UK economy, over 11 per cent of the UK Gross Domestic Product (GDP); employs one in nine working people; and, through the sale and promotion of goods, has a significant impact on a number of pressing challenges facing UK society (Rhodes, 2013). The UK retail sector was selected for the Delphi study since, in the last two decades, UK retail supply chains have achieved a high degree of vertical integration but currently horizontal logistics collaboration represents a possible future performance improvement option. There are a number of areas where UK retailers have been pioneers in terms of improving distribution management practices (Hingley et al., 2011). An example of this is the construction of large regional distribution centres to have more control over the planning and execution of their distribution networks from suppliers to stores. In particular, Tesco has led the way for innovation and process re-engineering in retail distribution (Smith and Sparks, 2004, Fernie et al., 2010). Hingley et al. (2011) found that although there could be further potential gains in UK retailers horizontally collaborating, there are sensitive areas that could inhibit horizontal collaboration among retailers. One of the main areas that could inhibit retailers in merging their distribution networks is the fact that they are competitors. This study focuses only on international distribution of products ordered and purchased by retailers, rather than the merging of UK domestic retail distribution, since retailers compete in the UK market but international distribution is a standard process where they could collaborate.

All contributing companies were represented by senior practitioners. One could argue that retailers, LSPs and suppliers might have several goals and some could be either synergistic or conflicting and that this can affect the results of the research. However, the aim of including senior managers from retailers, suppliers and LSPs from different supply chain nodes was to examine the feasibility of the adoption of horizontal logistics collaboration, which includes the examination of synergistic and conflicting goals. Moreover, in selecting the participating companies, the approach of heterogeneous sampling suggested by Saunders et al. (2009) was applied, targeting three types of companies: retailers, suppliers and LSPs. As suggested by several scholars (Cooper and Schindler, 2008; Locke et al., 2000; Maylor and Blackmon, 2005, Saunders et al., 2009), a non-probabilistic purposive sampling strategy was adopted to select the participating companies. Table 2 shows background information on the participating companies, as well as specifying the contribution of these companies to the research.

The interviews run as part of Stage 1 lasted approximately 60 minutes. Manufacturers were included in this stage since it was important to gather their perspectives and experiences on horizontal collaboration in the exploratory stage of the research. The questions asked in the semi-structured interviews are outlined as follows:

1. In which areas of your distribution networks do you think there is more potential for the adoption of a horizontal collaboration model?
2. What are the consideration factors which could affect the adoption of horizontal collaboration in UK retail primary distribution?
3. What are the ideal synergies which are required to support the adoption of horizontal collaboration among UK retail primary distribution actors?
4. What are the assisting enablers required for the implementation of horizontal collaboration in UK retail primary distribution?
5. What are the main output metrics which your company expects to improve due to the implementation of a horizontally collaborative logistics network in international inbound flows of UK retailers?

In Stage 2, a full-day focus group was conducted to verify the findings from the semi-structured interviews. The focus group was conducted at a full days meeting in a central location for the participants and was also attended by all the authors of this paper. It was chaired by one of the researchers in the role of facilitator. The agenda was derived from the findings of the interviews. It was agreed by all that no comments would be attributed to any specific organization and that confidentiality would be maintained beyond the walls of the meeting. This supported an open and productive discussion atmosphere. It is important to clarify that the senior managers who took part in the focus group had all participated in the semi-structured interviews conducted in Stage 1. However, the four main LSPs, which move grocery retail products from international locations to the UK on behalf the six participating retailers, took part in the focus group. The retailers' suppliers did not participate in the focus groups since in the vast majority of cases suppliers do not control and/or run international primary networks. In the focus group, a senior retail executive expert, who has worked at director level in four of the six participating retailers in the last 20 years, took part. The role of senior retail executive expert was to support the facilitation of the focus group, based on a strong track record in UK retail management. This helped the research team to test the validity of the findings gathered in the semi-structured interviews. The questions asked during the focus group were those seen as the most critical from the stage one semi-structured interviews.

The qualitative data gathered during the two stages was recorded by three researchers and the notes taken by these researchers were consolidated to ensure that all data was captured during the processes. Subsequently, the scripts produced from Stages 1 and 2 were synthesized by applying content-analysis, as recommended by Saunders et al. (2009), and transferred into an Excel spreadsheet based on the many themes discussed during the data collection. Moreover, the study followed Oppenheim's (1992) recommendations on how to reduce bias during the interview process by keeping a neutral stance during the process. As suggested by Locke et al. (2000), names of companies and interview partners' were anonymized, and interviewees were informed of this. Participants were also informed of the nature of the investigation and their role within the study. Furthermore, the benefits of participation were underlined. This was all clarified in the initial invitation.

Type of company	No of participants	Description of the company	Stages of Data Collection	
			Stage 1: Semi-structured interview	Stage 2: Focus group
Retailers	6	Major UK grocery retailers. All the product categories were considered.	6	6
Manufacturers	6	A mix of grocery retailers' suppliers with strong supply chain presence in Europe. Product categories supplied to retailers include: food, drinks and general merchandise.	6	None
LSPs	7	Selected LSPs with strong expertise in retail logistics and participating retailers are among their customers. All LSPs offer 3PL and 4PL services. Four of the LSPs have strong global presence and the other three are very strong in Europe.	7	4
Senior Retail Executive Expert	1	Long track record of working with one retailer and currently sits in the board of directors of other three retailers.	None	1

Table 2. Description of the participating companies and their contribution to the two stages of the research.

From all these data sources, the research team wrote a report based on the study findings. This report had two aims; (1) to give the opportunity to participants to provide feedback on the findings, and (2) to provide a sector-based report on horizontal logistics collaboration.

Before proceeding with the subsequent sections of the paper, it is pertinent to evaluate the quality of the research in terms of its validity and reliability, as suggested by Yin (2009). Table 3 shows the evaluation criteria recommended by Yin (2009) against tactics adopted in the different Stages of qualitative research.

The three types of validity suggested by Yin (2009), construct, internal and external, have been addressed. A wide range of evidence was gathered during the research and all the data sources were compared and analysed. The themes gathered in the two stages of the research were used in the analysis to cross-compare the findings. Furthermore, a protocol was developed to undertake the research to ensure reliability during the data collection process.

In the two stages of the research, data were gathered based on a well-developed protocol that was produced based on themes found in the literature. The findings gathered from the 19 semi-structured interviews were confirmed through the focus group. The focus group data were used to verify the findings from the semi-structured interviews. Also, the data gathered from the two stages of the research were tape-recorded and scripts from the interviews and focus group were produced and sent to participants to confirm that their recorded answers were correct. A report was produced and sent to participants to give final opportunities to the participating companies to provide feedback on the research.

Test	Tactics applied in the research	Research Stages
Construct validity	<ul style="list-style-type: none"> Multiple evidence was gathered during the two stages of the Delphi study, namely data collected from 19 semi-structured interviews and focus group. The data gathered during the two stages were appropriately confirmed. Drafts of the notes produced during the two stages were written and sent to participants for their approval. A report was generated and sent to participants to give them a final opportunity to provide feedback. 	Data collection and analysis
Internal validity	<ul style="list-style-type: none"> The data gathered from the two stages were analyzed based on themes found during the semi-structured interviews run in Stage 1. The data gathered during the two stages were analyzed by cross-comparing the responses provided by participants. Stage 2 was used to verify data gathered during Stage 1. 	Data analysis
External validity	<ul style="list-style-type: none"> In the two Stages run, a total of 19 companies participated in the study. The six largest UK retailers took part in the study, representing over 75% market share in the UK, together with seven leading LSPs and six strategic retailers' suppliers. Theory was used to inform the data collection. 	Research design process
Reliability	<ul style="list-style-type: none"> A protocol was developed to conduct the two stages of the research. In particular, the semi-structured interviews and focus group were run based on a well-developed protocol. This protocol was produced based on themes found in the literature review. 	Data collection

Table 3. Yin's (2009) tactics to evaluate the research quality

4. Findings

4.1 Findings from Stage 1: semi-structured interviews

Tables 4, 5 and 6 present the findings from Stage 1 of the outset consideration factors, ideal required synergies and actioning enablers of potential HLC initiatives. The vast majority of participants (all retailers and LSPs; and five from the seven manufacturers), stated that HLC is more possible in international distribution compared to UK domestic distribution: LSPs and manufacturers commonly viewed international distribution processes as a standard supply chain stage and retailers A, B, D and F argued that *“their companies do not compete in their international distribution operations, whereas they truly compete in secondary distribution and at the store shelves”*. Retailer A stated that *“at present, they do not have visibility of the distribution of products from international sourcing locations to their UK distribution centres, and they estimate that there should be considerable hidden costs in the international distribution of their products”*. This finding meant that scope of the research undertaken in this paper is mainly focused on retailers' international distribution networks, since, in the particular case of the UK retail logistics sector, the current attitudes from senior managers confirm that retailers are more inclined to collaborate in their international primary networks rather than in their domestic supply chain operations. However, this particular finding needs to be treated with caution because it is specific to the current views from the UK logistics retail sector and there could be untapped opportunities of horizontal collaboration among domestic manufacturers that supply products to UK retailers' distribution centres.

4.1.1 Outset Consideration Factors

The most important ‘*Outset Consideration Factors*’ (Table 4) were related to the “*horizontal partnership*” and “*internal company*” clusters. *Horizontal partnership* consideration factors (‘*trust among partners*’ and ‘*LSP support*’) were raised the most. In the case of ‘*trust among partners*’, all the retailers and LSPs A, B, C, D and F emphasised that trust is a quality that requires building, due to differences in culture and values among potential partners. For example, retailer D stated that there was a need for “*a fair and trusting relationship*”. Retailers D and E said that the HLC approach needs to be appropriate and include semi-open to closed book contracts that find the right balance between partners.

Smaller retailers and LSPs had concerns regarding potential ‘*competition issues*’ which could hinder the future of horizontal collaboration among retailers. However, representatives from all retailers and LSPs agreed that UK retailers do not have a competitive advantage in the area of international primary distribution, while all retailers have potentially substantial gains that could be earned from collaborating horizontally in international primary networks for sourcing from locations such as Spain, Italy, France, Czech Republic (food and drink) and China (general merchandise/clothing). LSP A stated that “*the current distribution of imported grocery retail products is fragmented and inefficient, and the retailers would gain substantially if their flows are consolidated and managed by fewer LSPs, that would make sure that UK retailers’ international supply chains are more responsive and efficient*”.

A number of participants (retailers A and D, LSP G and suppliers B and F) discussed how their company leaders felt that it was important that there was a supportive legislative framework (‘*Legislation*’) and attitude present if they were to have sufficient confidence in embarking on a HLC project.

For retail logistics partnerships to work an important ‘*internal company*’ factor was related to the company’s ‘*access to information and data security*’. All suppliers, with the exception of supplier A, said that access to primary inbound data could be an issue for retailers. The manufacturer B stated that, “*retailers need to involve their strategic suppliers in order to get visibility and access to international inbound data and negotiate with their strategic suppliers their potential involvement in the partnership*”. The participants from LSPs A and B agreed that the level of information sharing among retailers needed to be handled carefully to ensure data security and confidentiality. Nevertheless, LSP A said that, “*in current practice of horizontally collaborative networks, there effective commercial agreements exist that include fair costing mechanisms which restrict the disclosure of strictly confidential information*”.

Another important ‘*internal company*’ consideration factor was ‘*volume scale*’. Volume scale can be defined as when a shipper feels that when they are operating individually, in a dedicated way, they have insufficient shipment volumes on their own, over a set period, to warrant the frequency of deliveries that they would ideally like. By operating through HLC and combining volumes, greater frequency of delivery can be obtained, greater efficiencies can be realised through fuller shipments, and there are fresh possibilities to use other transport modes that require greater volumes to be viable. For example, retailer A stated that, “*one of the main drivers to join a horizontally collaborative distribution network is to increase the number of containers they move by rail and sea*”. A common view from retailers was that increasing ‘*volume scale*’ allows consolidation of loads across several product ranges into strategic inventory locations that could have the benefit of reducing product demand variability. According to retailers B and C, this was

particularly true when multiple product ranges were consolidated. LSP A stated that, “*when previously implementing HLC, demand volumes are normally stabilised due to the consolidation of more volume from a greater number of supplier collection locations*”.

Descriptors			Retailers						LSPs							Suppliers					
			A	B	C	D	E	F	A	B	C	D	E	F	G	A	B	C	D	E	F
Outset Consideration Factors When Contemplating Collaborative Logistics Project	External	Legislation	✓	-	-	✓	-	-	-	-	-	-	-	-	✓	-	✓	-	-	-	✓
		Corporate image to end-consumers	-	✓	-	-	-	-	✓	-	-	-	-	-	✓	-	-	-	-	-	-
	Horizontal Partnership	Trust among partners	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	-	✓	✓	✓	✓	✓	✓
		Competition issues	-	-	✓	-	-	✓	-	✓	-	✓	-	✓	✓	✓	-	-	✓	-	-
		LSP support	✓	-	✓	✓	✓	✓	-	-	✓	-	✓	✓	✓	-	-	✓	✓	-	-
	Supply Chain	Product characteristic	-	✓	-	✓	-	-	-	-	-	✓	-	-	✓	✓	-	-	-	-	-
		Network complexity	-	-	-	-	✓	-	-	-	-	-	-	-	✓	✓	-	-	-	✓	✓
		Level of supply chain control	-	-	-	✓	-	-	-	-	✓	-	✓	✓	-	-	-	-	✓	✓	-
	Internal Company	Access to inform /data security	-	-	-	✓	✓	-	✓	✓	-	-	-	-	✓	-	✓	✓	✓	✓	✓
		Commercial approach to HC	✓	✓	-	-	-	✓	-	-	-	✓	✓	-	✓	✓	-	-	-	-	✓
		Procurement & commercial functions	-	-	-	✓	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	-
		Investment required (ICT or other assets)	-	✓	✓	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	-	-
		Volume scale	-	✓	✓	-	✓	-	✓	✓	-	-	-	-	✓	-	✓	✓	✓	✓	✓
		CO ₂ agenda	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 4. Stage 1: ‘*Outset Consideration Factors*’ to review before embarking on a prospective HLC project (✓ = to be considered, – = not raised as an important consideration)

With regard to the factor ‘*company commercial approach to horizontal collaboration*’, the interviewees from the largest retailers and globally based LSPs emphasised that for them to embark on potential HLC, it was crucial to align their individual supply chain strategies with the partnership. For instance, retailer D mentioned that “*from retailer to retailer, there could be differences in terms of the supply chain strategies that retailers have; however, a potential HLC project could improve a wide range of supply chain metrics, which would justify retailers aligning their supply chain strategies to its requirements*”.

The *‘investment required’* for a prospective HLC project was not raised as a major hurdle, other than by a few participants (retailers B, C and LSP E). This was because only a few envisaged that working on a new HLC would require more asset and resource expenditure, as the vehicles would already be in place, whilst those who did predict that it would require significant investment felt that ICT development costs could be significant.

The only other *‘internal company’* consideration factor, *‘procurement & commercial functions’* (the need to incorporate into the retailers the buying groups, who place the orders for products from suppliers and are responsible for the sales and end customer availability of product, in any programme that seeks to find HLC opportunities beyond the vertical supply chain in order to secure full engagement from these groups and ensure that procurement and commercial metrics are carefully considered in the decision-making process) was not mentioned by many participants at this stage. Only retailer D and supplier C emphasised that both functions should be fully engaged in adoption of HLC so the organisation works in an aligned and coordinated manner.

4.1.2 Ideal Required Synergies

For the *‘Ideal Required Synergies’* that may be needed for a HLC project (Table 5), *‘common supplier & delivery bases’* was the most frequently cited. All participants, with the exception of retailer B and LSP D, considered this as being paramount for justifying the implementation of a potential HLC. For example, retailer A stated that, *“not having a common supplier base would offset the potential economies of scale and scope of planning from jointly executing collections at suppliers, since remotely located suppliers would add more miles into the transport plan”*. According to retailers B, D and F, the sourcing strategies of retailers need to be aligned with their potential HLC project to target suppliers in common sourcing regions and, if possible, common suppliers. Retailer C added the comment that *“there are a substantial number of international sourcing areas which are common among retailers”*.

‘Directional imbalances’ occur when the flows of goods present opportunities for synergies to improve efficiencies. For example, when a retailer has most of their stores in the south of the UK and suppliers in the north of the UK and other retailers have the opposite structuring of their flows, joining of their networks could reduce empty running. This synergy has been exploited in the past by large food manufacturers such as Nestle and United Biscuits. In the interviews *‘directional imbalances’* were not raised by retailers who all used similar suppliers using similar supply routes and hence no directional imbalances were envisaged. A few LSPs and Suppliers mentioned this as the LSPs saw opportunities to work across sectors to better utilise empty running on return legs and suppliers, who were also frustrated with the amount of empty running on return shipments, were keen to look into this area.

Retailers B, D and F emphasised the importance of *‘strategy alignment’* among retailers as they expected HLC projects to be over the longer term. LSPs A, E and G also believed that achieving a degree of supply chain strategy alignment among retailers’ international inbound networks was very important for their companies, since they wanted the partnership to be long-term to justify the investment required in physical and information and communication technology (ICT) infrastructure.

‘Similar service standards’ was raised by retailers A, C and E. Retailer A stated that *“the service standards of partnering retailers need to be similar in many cases and all retailers need to reach a compromise to a degree to make the partnership work”*. LSPs A, E and G emphasised that having *‘similar service standards’* among retailers was an extremely important synergy since, in their

experience during several initiatives at UK level, the savings and durability of the partnership was maximised when partners had similar service. LSP E noted that, “*standardising horizontally collaborative distribution networks need to have clear rules in terms which customer has priority in multi-dropped trips, and, retailers need to have less restrictive delivery windows*”.

Descriptors		Retailers						LSPs							Suppliers					
		A	B	C	D	E	F	A	B	C	D	E	F	G	A	B	C	D	E	F
Ideal Required Synergies	Strategy alignment	-	✓	-	✓	-	✓	✓	-	-	-	✓	-	✓	-	-	-	-	✓	-
	Ethics & values of collaboration	-	-	-	✓	-	-	✓	-	-	-	-	-	-	-	-	-	-	-	-
	Similar service standards	✓	-	✓	-	✓	-	✓	-	-	-	✓	-	✓	-	-	-	-	✓	-
	Common supplier & delivery bases	✓	-	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Directional imbalances	-	-	-	-	-	-	✓	-	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	-

Table 5. Stage 1: ‘*Ideal Required Synergies*’ to be present before a HLC project is embarked upon (✓ = required synergy, – = not raised as a required synergy)

4.1.3 Actioning Enablers

In terms of the ‘*Actioning Enablers*’ (Table 6) required for a HLC, the participating companies in Stage 1 placed the strongest emphasis on ‘*horizontal partnership*’ enablers. All participants from the 19 companies stated that it was extremely important to have an ‘*effective commercial model*’ (a way of working that is seen as fair and flexible and has the agreement of participants) for a HLC project to achieve its full potential. This needed to be supported by clear rules agreed by all participants.

Many envisaged that a 4PL, as a ‘*4PL orchestrator*’, could run the horizontal network neutrally and effectively. Retailer A stated that, “*the commercial model should include a 4PL orchestrator and the model should also include a great deal of subcontracting among 3PLs and all major manufacturers who supply UK retailers need to be involved*”. Retailers A, C, D and F emphasised that the 4PL needed to be neutral. One way of achieving neutrality, they argued, was to add value to the network by bringing ICT and optimisation capabilities, purchasing services from 3PLs and not using their own physical assets. For instance, LSP B noted that “*a 4PL is needed because, it enabled neutrality and effectiveness in horizontally collaborative distribution networks through strong ICT capabilities and subcontracted physical infrastructure required due to the complexity and time sensitivity of these networks continental/global networks*”. It was argued that risk assessment and contingency plans needed to be developed to ensure prompt responses in the event of any supply or delivery disruptions. While the contracts between the 4PL and the retailers could be open, semi-open or closed-book contracts, the vast majority of retailers seemed to be more comfortable with having a closed book contract with the 4PL if any of their competitors were involved in collaboration, since a totally open book model would not work due to the sensitivity of the data. An open-book could be considered when non-competitor companies, such as suppliers, were included. From recent experiences in horizontal partnerships, LSPs D and F advocated the adoption of semi-open book contracts among competitors because this type of contract enables transparency in the charging mechanism and at the same time ensures the confidentiality of data.

Furthermore, a significant number of participants mentioned that having an appropriate ‘*physical & ICT network infrastructure*’ was very important for a successful HLC project. In this regard, retailer C emphasised that, “*an effective physical infrastructure and ICT platform can enable a high level of demand responsiveness and efficiency in a horizontally collaborative network.*”

Two enablers related to ‘*internal company*’ and the following consideration factors were mentioned. Regarding ‘*synergistic demand & flexible scheduling*’, this was ‘*a crucial enabler for ensuring the service levels expected by each UK retailer*’ according to retailers B and C, LSPs D and F and suppliers C, D and E. Retailers D and F, LSP E and supplier A argued for ‘*standardised practices and supply chain strategies*’. This point was made particularly in relation to pallet sizes, where freight transport decisions, such as routes involving potential horizontal collaboration using a combination of transport modes and intermodal terminal locations, would require common standards across retailers to be in place. For example, LSP E emphasised that, ‘*if the pallet sizes are not standardised, there could be a considerable cost incurred due to unwanted sub-utilised space in vehicles*’.

Descriptors			Retailers						LSPs							Suppliers						
			A	B	C	D	E	F	A	B	C	D	E	F	G	A	B	C	D	E	F	
Actioning Enablers	External	Developing Government Legislative Support	✓	-	✓	-	✓	-	-	✓	-	-	-	-	-	-	-	-	-	-	-	-
		Sectoral group support (e.g. IGD, RHA)	-	✓	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	-
	Horizontal Partnership	Effective commercial model	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		4PL orchestrator	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	✓
		Capable 3PLs	✓	-	✓	-	-	✓	-	-	✓	✓	✓	✓	-	-	-	✓	✓	✓	✓	✓
		Physical & ICT network infrastructure	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Internal Company	Synergistic demand & flexible scheduling	-	✓	✓	-	-	-	-	-	-	✓	-	✓	-	-	-	✓	✓	✓	-	-
		Standardised practices and supply chain strategies	-	-	-	✓	-	✓	-	-	-	-	✓	-	-	✓	-	-	-	-	-	-
		Internal champions	-	-	✓	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	-

Table 6. Stage 1: ‘*Actioning Enablers*’ to facilitate a HLC project (✓ = identified enabler, – = not raised as an identified enabler)

4.1.4 Output Metrics

'Output Metrics' are summarised in Table 7. Retailers B, C, D, E and F stated that, in addition to significant reduction in freight transport costs, the potential for supply chain-based improvements should be available. These should include lead time compression, increase in shipment frequency and reduction in inventory level, specifically in inventory working capital. In particular, retailer B stated that, 'for a HLC project to be approved by their company board, it needs to bring benefits to their whole supply network rather than solely to their international freight transport network'. The retailers' view that HLC should bring improvements to their overall supply chains' performance levels was confirmed by suppliers and LSPs. However, LSPs stated that reduction in freight transport costs was very important for them. Retailer A stated that 'the main output metrics for the adoption of horizontal logistics collaboration were: cost decreases; CO₂ reductions; and/or lower inventory levels'. They added that a secondary and desirable output of HLC was that HLC could cause modal shift of freight normally transported by road to the UK from European suppliers to be transported by rail. This point was confirmed by suppliers D and E. A fall in food waste (out of shelf-life food) was another desirable key output metric for retailers E and F. Retailers A, E and F gave considerable emphasis to green measures wider than the traditional economically driven metrics which retailers have.

Descriptors		Retailers						LSPs							Suppliers					
		A	B	C	D	E	F	A	B	C	D	E	F	G	A	B	C	D	E	F
Output Metrics	Lead time	-	✓	✓	✓	✓	✓	-	-	✓	-	-	-	✓	-	-	-	-	-	-
	Shipment frequency	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	✓
	Cost	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	CO ₂	✓	-	-	-	✓	✓	-	-	-	-	-	-	-	-	-	-	-	✓	✓
	Rail split	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓
	Inventory	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Food waste	-	-	-	-	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 7. Stage 1: Identified 'Output Metrics' from a HLC Project (✓ = identified output metric, – = not raised as an output metric)

4.2 Findings from Stage 2: Focus Group

Table 8 presents an updated review of the three focus areas that were developed from the focus group. It should be noted that the 'consideration factors' and the 'ideal synergies' clusters were merged into one group in the table.

4.2.1 Outset Consideration Factors/Synergies

The focus group participants confirmed much of the results from the interviews in this area.

The area that attracted significant additional interest was the 'level of supply chain control'. It was agreed that retailers were far more instrumental here than had traditionally been the case, but that suppliers and LSPs also needed to be on board with any HLC initiative led by the retailers. For example, the participant from retailer D stated that within their company, 'there is a growing awareness of the need for HLC; nevertheless it is extremely important to have the support of

leading LSPs in the implementation of a HLC project'. The attendee from retailer A added that, *'although there are LSPs in the European logistics sector which are pro-HLC, working closer with 3PLs could be harder, since some 3PLs are afraid of losing market due to a HLC venture'* In addition, the participants agreed that, from the perspective of UK retailers, one of the main drivers would be the potentially significant improvements in the visibility and control of international distribution networks. The participant from retailer D stated that, *'suppliers and LSPs need to be on board with any HLC initiative'*. The senior executive specified that, *'from the perspective of UK retailers, one of the main drivers for the adoption of HLC would be linked to significant improvements in the visibility and control of international distribution networks'*.

Other consideration factors, namely *'product characteristic'* and *'network complexity'* did not emerge as important during the focus group discussion.

'Legislation support' was noted as the only important external factor by the senior retail executive who argued that, *'it is important to engage with policy makers from a range of UK government departments and be transparent when setting a horizontal collaboration partnership, since due to the UK Fair Competition Act, two of the companies he works for were fined a significant amount of money for collaborating with other UK retailers to reduce the overall carbon footprint of the sector as advised by the UK Government Department, DEFRA, at that particular time'*. This view was supported by the representatives of retailer D and LSP G. It was felt that retailers needed to engage policy makers from a range of UK government departments and be transparent when setting up a HLC project as, according to the UK Fair Competition Act, retailers could be fined for collaborating in any potentially anti-competitive way with other UK retailers.

With respect to the *'horizontal partnership'* factors, support from external third parties such as LSPs was confirmed as being paramount to the success of any HLC project. It was confirmed that participants in a HLC project needed to have the synergy of a *'common supplier and delivery base'* where all the retailers' loads were collected from international sourcing locations. Common supplier areas were vital because the cost and complexity of the new network could increase if they were included. The attendees from retailers A, B and C agreed that over 80% of their suppliers' locations were common to all the rest of UK leading retailers. Retailer A stated that, *'common sourcing/supply areas should be identified through a feasibility study to verify that multi-pick collections of multiple retailers are economically efficient'*.

Retailers A, D and F emphasised the benefits of consolidating freight volumes shipped to all retailers from common sourcing locations. In support of the findings from the semi-structured interviews, deficiencies in *'volume scale'* were agreed by all participants to be of strategic importance in encouraging players to become involved in a HLC initiative. They stated that HLC projects could potentially increase volumes of goods flows across the logistics network and thus a HLC project could be justified as part of a performance improvement strategy. Such a strategy could lead to the increased adoption of rail within their networks.

The *'development of consolidation and deconsolidation centres'* was a new topic that received substantial discussion in the focus group. It was felt that a HLC project could lead to the implementation of a mega-consolidation centre in Northern Europe close to the UK border to improve the responsiveness of the UK retailers' replenishment processes. This view was strongly supported by the senior retail executive as having the potential to provide a major development in performance for the inbound international grocery supply chain. Retailers A, B and D agreed, stating *'that deconsolidation centres close to the UK were paramount in increasing the*

responsiveness of the UK retailers' supply chains, since lead-time and frequency of orders could be improved'. The retailers C, E and F supported the view on a substantial increase in responsiveness generated from deconsolidation centres by agreeing that *'product orders could have a lead-time of day 1 to day 2 for all the European sourcing regions'*. With respect to who actually will run the logistic operation of the network, retailers A, C and F said that, *'the 4PL orchestrator needed to have a portfolio of competent and capable 3PLs'*. The retailers A, B and D also argued that, *'consolidation centres are important for the optimisation of supplier collections in the network'*.

Finally, on *'directional imbalances'* the participant from retailer F and the senior retail executive stated that major UK exporters could be integrated into the network, particularly in the case of cargo coming to the UK by rail, since the cost of rail freight movements could be reduced dramatically by integrating the distribution of UK imports and exports.

4.2.2 Actioning Enablers

In terms of *'Actioning Enablers'* of HLC, the vast majority of the issues raised through the interviews were endorsed in the focus group. However, *'internal company'* and *'external'* enablers were not mentioned with the same degree of emphasis or frequency as in the semi-structured interviews.

A strong emphasis was placed on the *'horizontal partnership'* enablers. All the participants endorsed the view that having an effective commercial model, run by a neutral *'4PL orchestrator'*, *'capable 3PLs'* and a suitable *'physical & ICT network infrastructure'* were vitally important. The representatives from retailers C stated that, *'the commercial model needed to include a neutral logistics provider to ensure fairness in the partnership'*. The participants from retailers B, D and E supported that idea by agreeing that, *'the only way that a logistics service provider could be neutral is if the logistics service provider played the role of a 4PL orchestrator'*. In agreement with that comment, the attendee from retailer A said that *'the 4PL orchestrator needs to calculate the rates in a fair fashion and rates need to be differentiated depending on the volume each partner put into the horizontally collaborative network'*. The representatives from retailers B, C and F confirmed that *'the commercial model needs to provide some visibility to the retailers of the costing of the partnership'*.

Descriptors			Retailers						LSPs				Senior Retail Executive
			A	B	C	D	E	F	C	E	F	G	
Outset Consideration Factors/Synergies	External	Legislation	-	-	-	✓	-	-	-	-	-	✓	✓
		Directional Imbalances	-	-	-	-	-	✓	-	-	-	-	✓
	Horizontal Partnership	Support from LSPs	✓	-	✓	✓	✓	✓	✓	✓	✓	✓	-
		Common supplier & delivery base	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Competition issues	✓	✓	✓	-	-	-	✓	-	✓	✓	-
		Development of Consolidation and Deconsolidation Centres	✓	✓	-	✓	-	-	-	-	-	-	-
	Supply Chain	Level of supply chain control	-	-	-	✓	-	-	✓	✓	✓	-	✓
Internal Company	Volume scale	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Assisting Enablers	Horizontal Partnership	Effective commercial model	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		4PL orchestrator	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Capable 3PLs	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Physical & ICT network infrastructure	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Internal Company	Synergistic demand & flexible scheduling	-	-	✓	✓	-	-	✓	-	-	-	✓

Table 8. Stage 2: ‘Outset Consideration Factors’ (incl. ideal synergies) and ‘Assisting Enablers’ of HLC focused on in the Focus Group

✓ = complete support, characterised as a primary driver;

- = Not raised during the focus group discussion as a driver or not

4.2.3 Output Metrics

In the focus group, there was general agreement regarding the main metrics that need to be considered and included in any quantitative feasibility assessment of a HLC project (Table 9). The main metric theme identified in addition to ‘*cost reduction*’ was linked to improved product availability at stores for end-customers, which was considered of primary importance by virtually all the retailers. Contributory measures to product availability included ‘*lead time*’, ‘*shipment frequency*’ and ‘*inventory reduction*’. These measures were regarded as priorities of UK retail supply chains and thus the judgement of any HLC should be assessed according to these measures.

Interestingly, retailers B, C, D, E and F all expected product availability-related metrics to improve as a result of HLC.

The collective view was that HLC has the potential to make a positive impact on a wide range of supply chain metrics that are beyond their pure freight transport operations. For example, the retailer E said that, *‘they are (not?) looking for taking cost out from their transportation and stock holding operations, but to increase stock availability is paramount for them’*. The participant from retailer F stated that at present, in the case of their Italy-UK primary distribution, they have a six-day lead time and they foresee HLC among retailers as a way of reducing Italian sourced product order lead time to two days. Retailer C emphasised that, *‘having a multi-retailer mega deconsolidation centre [distribution centre which would receive deliveries from all the European UK retailers’ suppliers and then deconsolidate the suppliers’ inbound shipments into the separate consignments ordered by UK retailer] in Northern Europe, in a location close to the South of the UK, for example in Lille or Brussels, could improve the responsiveness of the UK retail supply chains’*. The retailer A stated that, *‘their company expects lead time, shipment frequency and inventory levels to be at the same level, since in food products they already achieve a two-day lead time; nevertheless, there is a great potential to reduce the lead time in general merchandise products’*.

Other metrics that relate to the efficiency of supply chain processes were considered by participants as crucial. Perhaps not surprisingly, the importance of achieving ‘cost’ reductions from transport and ‘inventory’ holding operations was agreed by all participants. Retailers A, B and E also placed a strong emphasis on supply chain-based ‘CO₂ reduction’ as a key output measure. These views were fully supported by all participating LSPs. Retailer A stated that, *‘carbon reduction is a top priority for their company.... the adoption of HLC in Europe–UK retail primary distribution has the potential to increase the overall “rail split” of the retail sector, and as a result, reduce the carbon footprint’*.

Participants also mentioned that the 4PL, 3PLs and retailers need to have a fair share of the benefits and risks. Therefore, the common agreement among the focus group participants was that *‘the set of metrics which should be used to evaluate the performance of HLC should drive fair sharing of risks and benefits of the partnership to ensure that the partnership succeeds’*.

Descriptors		Retailers						LSPs				Senior Retail Executive
		A	B	C	D	E	F	C	E	F	G	
Output Metrics	Lead time	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Shipment frequency	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Cost	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	CO ₂	✓	✓	-	-	✓	-	-	-	-	-	-
	Rail split	✓	-	-	-	-	-	-	-	-	-	-
	Inventory	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Food waste	-	-	-	-	✓	✓	-	-	-	-	-

Table 9. Stage 2: ‘Output Metrics’ expected from a HLC project

(✓ = identified output, – = not raised as an desired output)

5. Supply chain-driven model for HLC among competitors

Figure 2 depicts a model based on the findings from the research undertaken in Stages 1 and 2. The elements presented in the figure were derived from the interviews and the focus group and were judged by the researchers to be the most appropriate according to the intensity with which they had been discussed during different stages, combined with already published research and trends in this area. The model has four elements reflecting the research phases of a typical journey from initial '*Outset Considerations*' that need to be appraised before embarking on a HLC project, the '*Ideal Required Synergies*' that are desirable for the project to work effectively, the '*Assisting Enablers*' that can be pursued to make the project more likely to improve performance and finally the '*Output Metrics*' that should be monitored.

In addition to different elements (factors, synergies, enablers and metrics) presented in Figure 2, a flow chart of the key decision points (for example, '*Suitable Environment*', '*Identify Collaborative Partners*') has been depicted to construct a successful HLC. '*Outset Consideration Factors*' allow a company on the individual company level to analyse whether there is a '*Suitable Environment*' by initiating a feasibility study into HLC. The next stage will involve identification of the potential collaborative partners with '*common supplier & delivery base*' and '*directional imbalances*' where a preliminary qualitative and quantitative analysis should be undertaken as part of the evaluation. The next two stages ('*Selecting Appropriate Partners*' and '*Agree on KPIs*') are the start of the HLC where a need for an orchestrator (e.g. 3PL/4PL) is essential to allow issues relating to trust and data confidentiality and security to be managed in a safe environment. Selection of the appropriate collaborative partner(s) among potential partners is the key decision point of the HLC project.

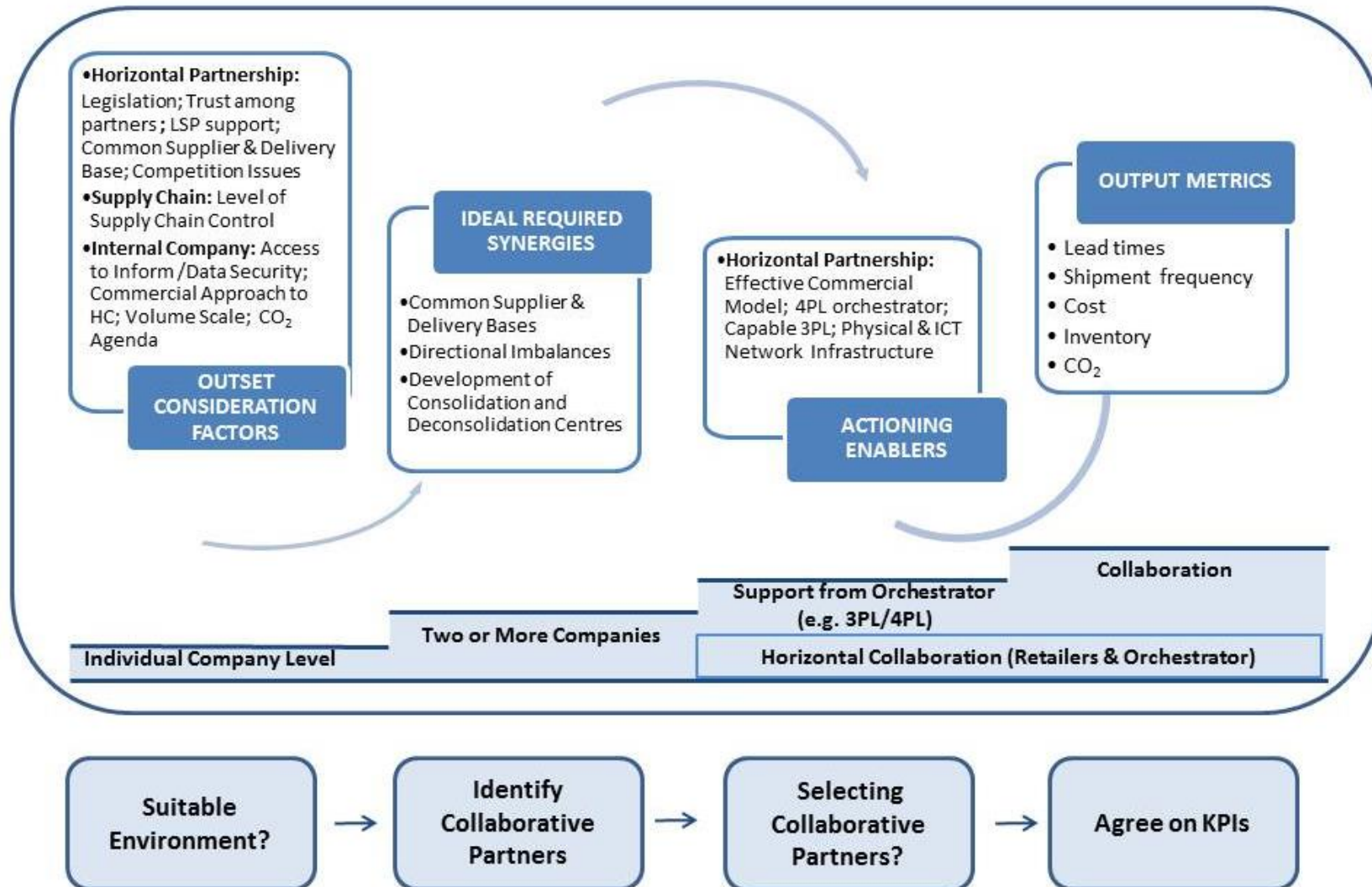


Figure 2. Supply chain-driven model for horizontal logistics collaboration

According to the analysis, the main ‘*Outset Consideration Factors*’ which need to be taken into account when initiating HLC are: ‘*legislation*’ (external factor), ‘*trust among partners*’, ‘*LSP support*’, ‘*common supplier and delivery base*’ and ‘*competition issues*’. Other ‘*Outset Consideration Factors*’ are: the ‘*level of supply chain control*’ of the companies intending to join a partnership and several factors related to the internal processes within the lead company (‘*access to information and data security*’, ‘*commercial approach to HC*’ and level of ‘*volume scale*’). The supply chain and logistics collaboration literature concentrates on the internal network factors rather than on external ones. This paper found some evidence that ‘*corporate image to customers*’ is very important. Our findings also showed that the existence of supporting legislation is a significant consideration factor that could drive or, if absent, hinder HLC initiatives.

This study found that ‘*trust among partners*’ and ‘*LSP support*’ could affect the adoption of HLC, confirming Lindgreen et al.’s (2009) findings. Although the importance of 3PLs is widely discussed in the literature, the support of LSPs, as a factor, does not seem to be a theme in previous studies. On the other hand, several authors have emphasised the importance of external or inter-organisational trust for the success of a HLC (Lee and Billington, 1992; Simatupang and Sridharam, 2002; Barratt, 2004). Although our study identified mainly ‘*external trust*’ as a key element of collaboration, the interviews in Stage 1 revealed that the development of intra-company trust between core business functions, like buying and logistics departments, was an important factor.

One significant theme related to the ‘*internal company*’ factors category was the ‘*level of supply chain control*’ of the companies that were seeking to collaborate. This factor was particularly relevant in the case of retailers with a weak bargaining power position compared to their supply chain partners. This finding confirmed the importance of this factor, which was emphasised in previous research, and suggests that the balance of power in the supply chain can hinder inter-company collaboration within and beyond supply chains (Cox, 1999; Barratt, 2004). According to Cruijssen et al. (2007a), uneven bargaining power between the companies that seek to collaborate can inhibit the adoption of HLC. However, our research showed that when companies are sourcing from international locations, potential increases in volume scale in the distribution of products were more important than the distribution of power among potential partners. Since our research demonstrated that competitors compete in core activities; international distribution was not viewed to be a core activity of retailers; thus, potential improvements in the distribution costs and supply chain responsiveness were more important than differences in power among potential partners.

Other factors were identified, namely: ‘*access to information and data security*’, ‘*commercial approach to HC*’, ‘*volume scale*’ and ‘*CO₂ agenda*’. In relation to ‘*access to information and data security*’, there was a strong emphasis in the literature on the availability and quality of information required to achieve a high degree of integration, in line with Frankel et al. (2002) who argued that there should be clear and broad lines of communication among collaborative supply chains. However, Frankel et al. (2002) did not clarify how the communication among partners could be clear and transparent. Our research found that an ‘*effective commercial model*’ was required to make HLC projects successful. The main elements of an effective commercial model were a 4PL orchestrator, a suitable ICT platform and links between players, physical infrastructure and a fair cost-risk sharing mechanism.

Among the internal company factors, the scope for ‘*volume scale*’ increases was confirmed as significant for demonstrating the business case of HLC, confirming the previous findings of Mason et al. (2007). Our study found that consolidation of freight volume and assets among HLC participants could significantly increase the economies of scale of a network. A new finding gathered in our study was that scope for ‘*volume scale*’ increases tends to be a much more important consideration factor in international distribution operations rather than in domestic distribution operations, since sourcing geographical regions are much more concentrated in domestic networks compared with international networks. Another important internal factor was the ‘*commercial approach to HLC*’. Ideally, there should be recognition that collaboration is seen as a priority for the long-term success of the company. As Skjøtt-Larsen et al. (2003) emphasise, HLC projects require a high degree of alignment between the supply chain strategy of the partnering companies and the ‘*commercial approach to HLC*’ of these companies, a view that the findings from this study fully endorse. A HLC project could work well with the ‘*CO₂ agenda*’ of organisations keen to act with a proactive stance in their sustainability strategies. Verstrepen (2013) states that the EU supports and drives HLC, since freight transport is responsible for about 25% of the EU greenhouse gas emissions. Although reduction in CO₂ emissions was found to be one of the metrics of horizontal collaboration in the context of international retail distribution, the study established that the benefits of HLC needed to be wider and include outputs related to the responsiveness of the supply chain and reduction in stock levels. These findings meant that in HLC projects a set of metrics needs to be developed that satisfies participants and strategic external stakeholders, such as relevant government departments.

For ‘*Ideal Required Synergies*’, our study found that the degree of supply chain strategy alignment between partners was not as important as internal and external trust among the parties involved. ‘*Ideal Required Synergies*’ identified for the model are ‘*common supplier and delivery bases*’, ‘*directional imbalances*’ and the ‘*development of consolidation and deconsolidation centres*’.

This study establishes the ‘*Actioning Enablers*’ required for the success of HLC projects in FMCG sectors where most of the enablers are linked to the ‘*horizontal partnership*’ grouping, namely an ‘*effective commercial model*’, ‘*4PL orchestrator*’, ‘*capable 3PL*’, ‘*physical and ICT network infrastructure*’.

In relation to an ‘*effective commercial model*’, Barratt (2004) proposes inter-organisational mutuality as a crucial enabler of collaboration within and beyond networks, a view that is supported by McIvor and McHugh (2002) who suggest that collaborative organisations should seek mutual benefits, as well as share the potential risks of their joint venture. Simatupang and Sridharan (2002) advocate the importance of aligning the incentives and rewards of a collaborative partnership, while Fawcett and Magnan (2002) and Daugherty (2011) state that partners should develop a common set of metrics to have transparency in terms of who is accountable for what. Cruijssen et al. (2007a) and Schmoltzi and Wallenburg (2011) found that for a HLC project to be successful there should be a fair allocation of benefits among partners. However, these two studies focus on collaboration among LSPs, which could be complementing or competing LSPs, and the contexts of these two studies are mainly in domestic logistics. Our study found that an effective commercial model that could enable HLC among competitors may need to have a neutral company orchestrating the partnership and, in the case of logistics collaboration, it was suggested a 4PL should have the role of designing and running the HLC project. Also, our study was focused on international distribution where logistics processes are standard and participating retailers show

willingness to seek a common ground / set of goals for the benefit of the performance of their supply chains. The findings also demonstrated that an effective model should allow retailers, suppliers, the 4PL orchestrator and suppliers to share the benefits (cost savings and/or risk reductions) fairly.

This study also identified important '*Output Metrics*' that need to be considered before adopting horizontal collaboration as an efficiency improvement strategy. Figure 2 illustrates metrics linked to the overall economic and environmental performance of supply chains, '*lead time*', '*shipment frequency*', '*inventory cost and levels*', '*CO₂*'. One of the main contributions of this paper is that to date only traditional transport-based metrics have been proposed in the HLC literature, whereas this study revealed other wider supply chain metrics as well.

6. Conclusion and implications

The supply chain and logistics literature tends to concentrate on factors, enablers and conceptual models for horizontal collaboration (Barratt, 2004; Mason et al., 2007; Daugherty, 2011, Vanovermeire et al., 2014) with some empirical research studies on synergies and output metrics. The recent literature tends to take a single function approach to horizontal collaboration (Crujijns et al., 2007a; Lehoux et al., 2009) and is often based on a single sector (e.g. Hingley et al., 2011).

In our paper, we have taken a supply chain approach where we present a supply chain-driven model for HLC that takes the perspective of many actors along the supply chain. Based on the two-stage approach, the contribution of our research is threefold: i) the identification of the '*outset consideration factors*', '*ideal required synergies*', '*actioning enablers*' and wider supply chain '*output metrics*' of a successful HLC; ii) the development of a supply chain-driven model for HLC; and, iii) the proposal of a new definition for HLC which challenges published definitions. Several consideration factors, synergies, and enablers that support the development of HLC are identified, such as '*legislation*', '*trust among partners*', '*common suppliers and delivery bases*', '*capable 3PL*' and an '*effective commercial model*' (including a fair sharing of benefits). The participating practitioners emphasise that freight transport '*cost*' should not be taken as the main, or sole, metric to measure HLC and other, broader metrics related to availability and the overall supply chain costs need to be considered, namely '*shipment frequency*', '*lead times*', '*inventory cost*' (in particular, inventory working and fixed capital) and '*CO₂*' emissions.

The study developed in this paper has the potential to have significant managerial implications. The research demonstrates the importance of taking a supply chain approach when evaluating the feasibility of horizontal collaboration among competitors. In this regard, HLC arrangements need to be designed and run by taking into account all supply chain partners, namely suppliers, 3PLs and customers (in this case retailers). One key issue that needs to be taken into account is that HLC arrangements between retailers have the potential to shift the bargaining power in the supply chains involved from the suppliers and 3PLs to the retailers and the 4PL. Hence, strong negotiations between retailers and their suppliers and 3PLs need to occur to ensure HLC projects are successful. Furthermore, the main elements and generic themes found in the research can be applied to other supply chain and logistics functions, such as warehousing, packaging and manufacturing. The research demonstrates the crucial role a neutral third party company can play in a HLC project. This principle can be further extended in its application in other sectors and supply chain functions.

Finally, the research in this paper provides grounds for challenging the current accepted definitions of HLC. The published definitions are based on the argument that ‘concerted practices between companies at the same level(s) in the market’ should occur for HLC to take place. However, it is clear from this research that HLC is about logistics across whole parallel supply chains being synergised and that this can be organised by actors that do not necessarily have to be at the same level. For example, logistics providers can work with retailers, retailers can work with manufacturers and so on. We thus propose a new definition of horizontal logistics collaboration as follows:

‘in parallel supply chains, a collaborative relationship(s) that identifies and realises synergistic logistics activities among suppliers, customers and/or logistics service providers’

An implication of this research is that, due to the fact that the study focuses on one sector and one area of logistics (the inbound pan-European leg), it will be beneficial to test the proposed model in other settings to assess its applicability in wider contexts. By undertaking cross-case research from a wide range of geographies and sectors, this research can be further validated. The research may also lead in several other directions for future research. A series of case studies from several industry sectors should be run to determine the main critical success factors of HLC and main challenges encountered during the implementation phase of these cases. An action research study could be run to gain further depth into all elements required in the implementation of a HLC project. A survey could be used to undertake a statistical analysis into the importance of different elements. HLC modelling among competitors can establish the effects of different supply chain structures on the outcome metrics found during this research.

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