



**AN ANALYSIS OF THE IMPLEMENTATION OF HORIZONTAL
COLLABORATION TO ENHANCE PERFORMANCE IN THE
LOGISTICS INDUSTRY**

Thesis submitted in accordance with the requirements of the
University of Liverpool for the degree of Doctor in Philosophy

by

LUCY ANNE EVERINGTON

June 2013

ABSTRACT

This thesis examines the extent to which horizontal collaboration is being undertaken in the logistics industry, the different ways horizontal collaboration is being implemented in the logistics industry and the performance enhancements that can be achieved by logistics companies through horizontal collaboration partnerships. Research into the subject of horizontal collaboration has only in the past 5 years gained enough momentum and support to become a topic in its own right, rather than a footnote to research on vertical collaboration. For this reason existing research on the topic has been confined to a small number of areas and very little literature exists on comparing the performance enhancements of different types of horizontal collaboration.

This research involved a large-scale survey to investigate general patterns and perceptions of horizontal collaboration in the logistics industry and following that a number of case studies were undertaken to gain in-depth knowledge of how horizontal collaboration can be successfully undertaken. The results from these were then developed into a set of guidelines which can be used by logistics companies implementing horizontal collaboration by providing information on issues such as problems that can be addressed using horizontal collaboration, necessary partner requirements, necessary internal requirements, duration and formality of the collaboration, benefits, risks and obstacles for each of the four main types of horizontal collaboration being undertaken in the logistics industry.

Horizontal collaboration was found to be a wide-spread practice in the UK Logistics industry across companies of all sizes and types. The most common form of horizontal collaboration is ‘shared services’, however, ‘joint ventures’ are perceived to be the most effective form of collaboration.

Keywords: Collaboration, Co-opetition, Performance

ACKNOWLEDGEMENTS

Firstly, I would like to thank my supervisor, Professor Andrew Lyons for his guidance throughout the duration of this research. I would also like to thank him for employing me on the REMPLANET project, which allowed me to complete this research. I would also like to thank Dr Hossam Ismail, Dr Iain Reid and Dr Peter Kahn for employing me on other projects, thus enabling me to complete my PhD without bankrupting myself!

My sincere appreciation goes to all the people who helped with this research in terms of responding to my survey and particularly to the people who were willing to be interviewed as part of my case studies.

My final thanks goes to all those people both within and outside of the University who have helped me stay sane, these past four years, and have insisted that I do occasionally leave my desk and research and actually try having a life!

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CHAPTER 1

INTRODUCTION

1.1 Research Background and Motivation

Rising operating costs and relentlessly increasing international competition are forcing logistics companies to look outside their own organisational boundaries for new and innovative sources of competitive advantage and performance improvement. Collaboration is becoming essential to staying competitive. In simple terms, inter-organisational collaboration can be classified as vertical or horizontal. Vertical collaboration is concerned with partnerships formed along a linear, upstream-downstream supply chain continuum. Conventional customer-supplier relationships are vertical in nature. Horizontal collaboration is a growing trend in contemporary supply chain design. It concerns collaboration between organisational entities providing the same or similar service. This paper specifically focuses on the horizontal form of inter-organisational collaboration. Horizontal collaboration has been formally defined as “a business agreement between two or more companies at the same level in the supply chain or network in order to allow ease of work and co-operation towards achieving a common objective” (Bahinipati et al., 2009). Co-opetition is another term often used to describe a similar type of relationship, described as occurring where “co-operation and competition exist within the same relationship” (Ritala et al., 2009.) There is a difference between the terms; horizontal collaboration is a more inclusive term and concerns both co-operation between competitors and co-operation between companies that provide the same or similar products or services but are not in direct competition, whereas co-opetition specifically refers to collaboration between direct competitors.

Horizontal collaboration is a different concept to sub-contracting, whilst no academic research has been published that has focused on defining the differences between horizontal

collaboration and subcontracting, Webster et al., (1997) does attempt to make the distinction between vertical collaboration and subcontracting. This work gives a definition of subcontracting as ‘a process where a subcontractor (ie an organisation with business objectives that are independent to those of the principal) performs a service for the principal to a specification laid down by the principal’ (Webster et al. 1997).

This definition differs from horizontal collaboration in a number of ways. Firstly, horizontal collaboration involves two or more companies with objectives that are similar or the same, for example, both companies could be looking to increase fill utilisation of a particular route or increase services to a particular market or customer. Secondly, for a subcontracted process, the subcontractor will fulfil a task for the principal company utilising their resources, the subcontractor will not have tasks of its own undertaken by the principal company. In horizontal collaboration resources are shared by the companies, giving all companies access to partner companies resources. For example in a shared route case, Company A will operate the route three days a week and Company B will operate the route three days a week. Thirdly, the specification of the services will be defined collaboratively between the companies, rather than being dictated by the principal company.

Previous research undertaken within the logistics industry has focused mainly on the drivers and barriers to horizontal collaboration, “by co-operating with other industry players, companies can achieve synergies and competitive advantages that are too expensive to grow internally or acquire” (Lydeka and Adinavicius, 2007). Cruijssen et al., (2007a) concluded that horizontal collaboration can improve productivity and savings. Mason and Seymour (1995) highlighted the cost savings that can be achieved through the use of horizontal collaboration in terms of the reduction of duplication, lowering of operating costs and cost avoidance opportunities due to the reduction of capital spending on items such as information systems. Mesquita and Lazzarini (2008) suggested that small and medium sized enterprises

(SMEs) can gain significant advantages through the implementation of horizontal collaboration including cost reductions and access to new markets. However, despite these advantages, many companies are reluctant to form horizontal partnerships due to the numerous barriers to successful implementation and the difficulty of sustaining the alliance. Langley (2000) considers reluctance within an organisation to be one of the main barriers to horizontal collaboration. Co-operating with a competitor is intuitively counterproductive but Langley (2000) believes logistics companies need to embrace the idea if they are to survive. Huxham (2003) identified the key barriers to collaboration as the lack of common aims, power sharing problems, lack of trust, and the complexity of developing a membership structure for a collaboration.

A key goal of this study is to build upon the outputs of previous research (notably Mason et al. (2007), Lydeka and Adomavicius (2007) and Cruijssen et al. (2010)) and capture a broad view of how horizontal collaboration is being undertaken in the logistics industry. Specifically, the research attempts to empirically establish the effectiveness of different forms of horizontal collaboration adopted by companies providing logistics services, and to support the decision-making processes of logistics practitioners by providing useful policy information concerning the formation of different types of horizontal alliances and the execution of horizontal initiatives. This research provides a set of guidelines which amalgamates knowledge gained through this research to provide companies with guidelines for undertaking the four main types of horizontal collaboration.

1.2 Objectives of the Study

The main objective of this study was to investigate the use of horizontal collaboration in the logistics industry and the performance benefits associated with it. This study is primarily an exploratory study seeking to gain insight into how and where horizontal collaboration is

being undertaken and also to investigate why horizontal collaboration is being undertaken. A number of specific research questions associated with this aim are expressed as follows.

- To what extent is horizontal collaboration being utilised by companies of different sizes and types? This aim was focused on investigating at a high level the extent to which companies in the UK are involved in horizontal collaboration and whether this implementation level is affected by factors such as type and size of company.
- What are the main drivers and barriers to horizontal collaboration in the logistics industry? Previous research has considered to some extent the major drivers and barriers to horizontal collaboration, this research attempts to quantify the main drivers and barriers to horizontal collaboration. This research also considers whether the drivers and barriers are affected by any additional factors such as company type and size and the type.
- To what extent are the different types of horizontal collaboration undertaken in the logistics industry? The literature on horizontal collaboration identifies a number of types of horizontal collaboration, this research aims to identify to what extent each of these types of collaboration is being undertaken and identify any underlying factors that are responsible for this.
- How do these types of collaboration differ in terms of characteristics such as number of partners, time scale and formality of the collaboration? No attempt had previously been made in published literature to compare and contrast the structure of different types of horizontal collaboration in the logistics industry. This research aimed to make these comparisons on factors such as number of partners, length of collaboration, formality of the collaboration and geographical location of partners.
- What characteristics of the horizontal collaboration projects or the partners involved contributes to the effectiveness of the collaboration. As well as considering the

structural differences between the types of collaboration, this research sought to investigate how effective each type of collaboration was perceived to be and identify any underlying factors that influenced this.

- What are the major performance enhancements of implementing the different types of horizontal collaboration? The final objective of this research was to compare and contrast the benefits that companies had obtained from horizontal collaboration partnerships. This allowed generalisations to be made on the benefits that can be gained from each type of collaboration.

This research aimed to use all the conclusions that were drawn from these objectives to develop guidelines to guide and encourage logistic companies to implement horizontal collaboration. These guidelines aimed to offer them guidance on which type of horizontal collaboration would be most appropriate to address particular issues, the partner requirements for each type of collaboration, this included number of partners and level of complementary or similar processes or issues companies need to share with their partners, the time scale and formality of the collaboration, the potential benefits of the particular type of collaboration, the obstacles to implementing the partnership and the potential risks associated with each type of collaboration.

Whilst the aim of this research was to produce a holistic study of horizontal collaboration in the logistics industry, there are a number of factors that have been studied in academic literature that are thought to be of importance to horizontal collaboration research that have not been studied in this research. This was partially due to time and resource constraints, this research alone could not cover all the factors at play in horizontal collaboration. However a number of specific factors and the reasons for their omission are explained below.

- 1) Environmental issues and impact on carbon policies, whilst academic papers such as Fernie et al., (2000) illustrate that horizontal collaboration can be used in the logistics

sector to allow companies to comply to tightening emissions laws, the companies surveyed in this research indicated that environmental and emissions concerns were not a significant driver to horizontal collaboration, For this reason this research does not include research on this factor.

- 2) Legal issues in relation to competition laws in the UK, EU or globally. This was an issue that was neither indicated by respondents in the questionnaire or mentioned in any of the case study interviews. In the interviews, when invited to talk about difficulties in implementing horizontal collaboration, respondents focus tended to be on selecting partners and for this reason this topic was not included to allow more time to be spent on the factors that had been indicated as more important.
- 3) Power issues with respect to the relationships between the collaborators, this topic has been paid significant attention to in the literature, mainly from a theoretical point of view. Whilst, ideally this topic would have been studied within the case study part of this research, it was found to be a topic that representatives from the companies studied, were unwilling to discuss and therefore, the topic had to be excluded from this study.
- 4) The impact of technology and integration of dissimilar IT systems, this was an issue that was shown in the survey part of this research to not be as important as academic literature had previously indicated. Less than 30% of respondents felt this was a barrier to horizontal collaboration compared to 73% and 71% for the top two barriers. This low agreement level coupled with company representatives being unwilling to discuss the specifics of their systems and their partner's systems lead to this factor being omitted from the study.

1.3 Research Scope and Sample

This study primarily examines UK based logistics companies due to time and scope constraints, however, a minority of respondents were from other countries due to input from companies already known to the research group. This study considers any company that considers its primary function to be to provide logistics services regardless of whether this is through use of their own resources or through use of sub-contracting, thus selling the service of co-ordinating customers logistics needs rather than providing the actual transport infrastructure. It also considers logistics providers of all sizes. This is similar to the surveys carried out by Cruijssen et al. (2007a) and the Eye for Transport (2010) survey.

1.4 Analytical Steps Undertaken

This thesis is organised into six further chapters, which are introduced below.

Chapter two reviews relevant literature on the subject of horizontal collaboration in the logistics industry and other industries. This includes literature on general horizontal collaboration implementation, drivers and barriers to horizontal collaboration, specific types of horizontal collaboration and the necessary conditions needed for successful collaboration. It also considers examples of horizontal collaboration within different sectors of the logistics industry.

Chapter three outlines the methodology steps and the justification for the use of the different research methods that are used in this study. This includes issues such as questionnaire design, delivery method and sampling method as well as explaining the statistical techniques used to analyse the data. It also explains the rationale behind the choice in case studies and the procedures carried out when undertaking case studies.

Chapter four outlines and provides some discussion of the results obtained from the initial questionnaire. This is split into a number of sections which outline the initial bias testing

carried out, the profile of the respondents, the drivers to horizontal collaboration, the barriers to horizontal collaboration, the types of horizontal collaboration, horizontal collaboration features, partner attributes, cost and benefit sharing models and termination of collaboration projects.

Chapter five is focused on the results and analysis of the follow-up questionnaire and considers the effectiveness scores for the different types of horizontal collaboration and for the different types of resource sharing partnerships, the testing of other factors thought to influence perceived effectiveness of horizontal collaboration, formality of horizontal collaboration, maturity of horizontal collaboration practices and the future of horizontal collaboration.

Chapter six presents the seven case studies which were undertaken in this study and describes each of the companies these were undertaken in, their questionnaire responses, the rationales for choosing each case, the network structure of the company, the case description and the performance enhancements seen in each case.

Chapter seven discusses the results from each stage and attempts to bring the results from the different sections together to provide a set of guidelines distinguishing between a number of key features for each type of collaboration.

Chapter eight, the final chapter of this thesis provides an overview of the study findings and the contributions of this research. This section also discusses the limitations of this study and suggestions for further research.

CHAPTER 2

A REVIEW OF THE LITERATURE

2.1 Introduction

The chapter reviews in detail, the literature associated with horizontal collaboration. Horizontal collaboration is a fairly new topic in management literature with the majority of the dedicated literature being written from 2000 onwards, although, the concept is mentioned in papers on general or vertical collaboration prior to this.

This chapter will start with a review of general horizontal collaboration which will define the concept of horizontal collaboration and the main issues surrounding it. An attempt will also be made to review and classify different types of horizontal collaboration in preparation for further development within this thesis.

This chapter will develop a background for the research undertaken in this thesis by considering the performance advantages that have both been observed in case studies and that have been theorised through mathematical models or theoretical frameworks.

The main reason for the focus in this study on the logistics industry as opposed to manufacturing industry is due to the prevalence of horizontal collaboration literature and practice in this area. This chapter will build a review of how and why horizontal collaboration is being undertaken in the logistics industry. It will also consider how horizontal collaboration is being undertaken in different sectors of the logistics industry and by different types of companies.

2.2 Introduction to Horizontal Collaboration

Horizontal collaboration is a growing trend in contemporary supply chain design. It concerns collaboration between organisational entities providing the same or similar service. Collaboration can be defined as “a relationship characterised by openness and trust where

risks, rewards and costs are shared between the parties” (Sandberg 2007). Horizontal collaboration has been formally defined as “a business agreement between two or more companies at the same level in the supply chain or network in order to allow ease of work and co-operation towards achieving a common objective” (Bahinipati et al., 2009). This allows the companies to collaborate whilst maintaining their general legal independence (Schmoltzi and Wallenberg 2012).

Co-opetition is another term often used to describe a similar type of relationship, described as occurring where cooperation and competition exist within the same relationship (Ritala et al., 2009). There is a difference between the terms; horizontal collaboration is a more inclusive term and concerns both cooperation between competitors and cooperation between companies that provide the same or similar products or services but are not in direct competition, whereas co-opetition specifically refers to collaboration between direct competitors.

Collaboration in supply networks occurs predominantly in two different dimensions, vertical or horizontal (Baratt, 2004, Mason et al., 2007). Academic research has extensively addressed the topic of vertical collaboration (Naesens et al., 2009). Horizontal collaboration has received less attention in the literature to date. Existing horizontal collaboration literature has focused on simulation studies which quantify cost savings and reporting on a small number of case studies (Cruijssen et al., 2010).

Whilst horizontal collaboration has received less attention in academic literature, most of which is post 2000, there is evidence that the horizontal collaboration had been occurring on a wide scale prior to this. Harbison and Pekar’s (1998) study on alliance formation showed that 50% of all new alliances being created at the time were horizontal rather than vertical.

The aim of horizontal collaboration is to create a win-win situation for all partners. Many factors are driving companies to consider horizontal collaboration. The shortening of product lifecycles (Simatupang and Sridharan 2002), increased globalisation (DeMartino et al., 2007), increased fuel prices (Ferne et al., 2000) and increasing customer demand for customised products (Cravens and Piercy 1994) have all led companies to look for new ways to achieve cost savings and enhance customer service. Horizontal collaboration can provide companies with the means to achieve economies of scale and use outside expertise without outsourcing a function completely and losing all competence in that area (Cruijssen et al., 2007a). Research has shown that the main motivators for involvement in horizontal collaboration are resource accumulation and improving competitive advantage compared to rivals (Oxley et al., 2009).

Horizontal collaboration is considered to be most effective when carried out in non-core activities especially those activities that do not directly interact with customers (Bengtsson and Kock, 2000) whilst the companies remain competitive in core activities.

2.3 Performance benefits of Horizontal Collaboration

Effective collaboration between companies in a supply chain has been proven to reduce costs (Naylor, 2010), increase flexibility (Naim et al., 2006), and increase customer satisfaction (McLaren et al., 2002).

Studies have shown many different benefits can be obtained through horizontal collaboration. Survey research by Hoffmann and Schlosser (2001) showed that the four most common benefits to horizontal collaboration for SMEs were access to new markets, cost reduction, access to new technologies and risk diversification.

Despite these benefits Luo et al. (2009) state that overreliance on horizontal partnerships can be harmful. Empirical results show high intensity of alliance activity to have a negative influence on profitability of manufacturing units

This section will discuss these benefits and attempt to classify them in terms of cost related benefits, efficiency related benefits, customer service related benefits and flexibility related benefits.

2.3.1 Cost related performance benefits

Cruijssen et al. (2007a) concluded that horizontal collaboration can improve productivity and savings. Mason et al. (1995) highlighted the cost savings that can be achieved through the use of horizontal collaboration in terms of the reduction of duplication, lowering of operating costs and cost avoidance opportunities due to the reduction of capital spending on items such as information systems. “By co-operating with other industry players, companies can achieve synergies and competitive advantages that are too expensive to grow internally or acquire” (Lydeka and Adinavicius, 2007).

Horizontal collaboration is often used for research and development and systems development where neither company could afford to invest as highly in these areas on their own, so by pooling resources and costs they can afford further development. Von Stamm (2004) suggested that as well as achieving lower overheads through horizontal collaboration of research and development, accelerated innovation through more rapid problem solving could be achieved.

Esper and Williams (2003) suggest that companies can achieve an increased return on investment through horizontal collaboration by geographically widening the market place for their goods or services. Horizontal collaboration can be used to enter new markets with significantly lower costs and risks than if they had entered the market individually (Mesquita

and Lazzarini 2008). Waite and Williams (2009) suggest that this is particular true in the case of entering overseas markets (Waite and Williams, 2009).

Horizontal collaboration can allow companies to bid for projects as a consortium or partnership thus allowing them to bid for contracts that require levels of investment and risk than they would not be able to take on individually, but, that will also give them greater benefits (Garette et al., 2009). Companies may not be large enough to deal with the entire of the order a customer is going to place or may only have some of the skills needed but by working as a consortium it is possible they will be able to obtain contracts that would otherwise have gone to larger players.

In terms of benefits to the logistics industry, reports have shown that reduced transport costs (Caputo and Minnimo, 1996), can be achieved through efficiency saving partnerships such as freight consolidation.

2.3.2 Efficiency related performance benefits

One of the efficiency savings often mentioned in horizontal collaboration trade articles and industry reports, such as Chalmers (2008) and Department for Transport (DFT) (2012) is the reduction of empty running miles and increased fill rates. By collaborating on identical or similar routes companies can increase the fill rate or decrease the empty running miles or a combination of both, to increase their overall efficiency.

Low fill rates and empty running miles are a major problem in the logistics industry at the moment, with approximately 29% of heavy goods vehicles running empty on UK roads (Freight Transport Agency (FTA) 2012). Whilst in the airfreight industry, the International Air Transport Association (IATA) (2012) estimates the average fill rate of freight aircraft to be below 50% in 2011.

As well as the obvious efficiency and cost savings for the company that are associated with increased fill rates and decreased empty running miles, McKinnin and Edwards (2010) point out that horizontal collaboration in the logistics industry can give general benefits to society through the reduction of trucks on the road and therefore a reduction in the carbon emissions and congestion. Whilst these may not directly benefit the company, press releases saying that they have reduced vehicle numbers and lowered carbon emissions may raise their profile and make them more appealing to companies with a green agenda.

2.3.3 Customer service related performance benefits

Collaboration can allow companies to provide a higher level of market and service coverage (Verstrepen et al., 2009); this means customers only have to work with a single company to find solutions to all their logistics needs. If logistics companies can increase their service range through horizontal collaboration, this can allow the customer to only have one point of contact for any queries or problems they have with their shipments, providing a more personalised service.

Horizontal collaboration can allow companies to enter new markets, thus gaining new customers (Lee 2007). This often occurs when a domestic company partners with a foreign company. This allows for customer to access new, often global services which they can purchase through the domestic company, allowing for the cultural environment of the particular geographical area to be maintained (Li et al., 2001), making customer interaction with the company easier for the customer than if they had to deal with the differing customs and culture of a foreign company.

A survey of horizontal collaboration practices in European supply chains showed that 60% of shippers, 50% of 3PLs and 55% of carriers believe horizontal collaboration is a very

important driver encouraging companies to undertake horizontal collaboration (Eye for Transport 2010).

2.3.4 Flexibility related performance benefits

Hung and Chang (2012) suggest that horizontal collaboration can allow companies to offer their customers a wider range of goods or services than they would be able to offer on their own. A literature review on 3rd party logistics providers by Selviaridis and Spring (2007) suggests that a rise in outsourcing of logistics has led to the rise of large 3rd party logistics companies which are aiming to provide a full suite of solutions to their customers. Horizontal collaboration is one of the ways small companies can work together to increase their suite of services and therefore compete against the large multi-national 3rd party logistics providers.

2.3.5 Benefits for SMEs

Mesquita and Lazzarini (2008) suggested that small and medium sized enterprises (SMEs) can gain significant advantages through the implementation of horizontal collaboration including cost reductions and access to new markets. It could be suggested that since they have lower resource levels SMEs are likely to benefit from horizontal collaboration more than large companies. SMEs can use horizontal collaboration to allow them to compete with the wide ranging services offered by the larger logistics companies, Kock et al. (2010) particularly advocated the use horizontal collaboration allow SME's to increase their geographical service reach.

Research into horizontal collaboration specifically in SMEs will be discussed in more detail in the sections on specific types of collaboration, particularly joint procurement which is thought to be a form of collaboration most appropriate to smaller companies due to its direct increase in their bargaining power.

2.3.6 Benefit/Gain sharing

This is a topic that has received significant attention in the literature, in terms of what affects a company's negotiating power in the development of a gain sharing model, what types of gain sharing models can be used and what issues this leads to in horizontal collaboration.

Krajewska et al. (2006) discuss the factors that influence the way the gains achieved by horizontal collaboration are shared, the features they considered to be the most important were the distribution of power among the companies, on their level of interdependency and willingness to make compromises, and on the market within which they operate

Crujssen et al., (2007a) found that devising an acceptable way of dividing the gains of a collaboration project was one of the major barriers to implementing horizontal collaboration. Their research indicates that using simple and transparent method for dividing the gains is often the best way of solving this problem. They include a number of examples of how this can be done. These are as follows, gains should be:

- 1) Proportional to the total load shipped;
- 2) Proportional to the number of customers served;
- 3) Proportional to the number of orders;
- 4) Proportional to the transportation costs prior to the collaboration;
- 5) Proportional to the distance travelled for each shippers orders;
- 6) Based on inter-drop distances of constructed joint routes;
- 7) Based on direct distances from depot to outlet (Crujssen et al. 2007a).

A number of papers have developed mathematical model for determining how gains should be shared, examples of this type of research includes Samaddar and Kadiyala (2006) which considers knowledge gains. There is a distinct subsection of this type of research which uses game theory to allocate gains and included papers such as McCain (2008), Lozano et al.,

(2013) which relates specifically to the logistics industry and Naesens et al., (2007), which developed a three part framework, where the second part was dedicated to working out the gains for each company. This paper was also focused on the logistics industry. A further example of this type of research is Krajewska et al., (2007), which aimed to extend work done in this field by modelling cases where the power and market positions of the companies were different.

Vestrepen et al., (2009) put forward the idea that companies should chose to collaborate with companies of a similar size and bargaining power to ensure a fair or equal gain sharing model is agreed upon. However, Ahuja (2000) presents an argument that contradicts this point, with this paper arguing that companies should collaborate with the companies that would give them the highest benefits possible. Choosing to collaborate with a company which would give the focal company the highest access to other resources and markets, would likely lead to collaborating with a larger company, which would give it a higher bargaining power.

Hingley et al., (2011) propose the use of a third party to aid companies in developing a fair method of gain sharing. Their study specifically considers the use of 4th Party Logistics Companies to facilitate logistic function collaboration between Grocery companies.

An additional issue with developing gain sharing models comes from company's failure to understand and identify differing priorities (Sabath and Fontanella, 2002) and using the wrong measures to assess the collaboration can also cause collaborations to fail. For each company, the goal of a collaboration may be to improve performance in a different area. If companies have differing priorities that are not understood clearly and the expectations of each company are not explicitly defined at the start of a collaborative venture, tensions will arise between the companies (Whipple and Frankel, 2000). Perceived unfair gains to one partner in the collaboration may lead other partners to exit the alliance.

2.4 Difficulties in Implementing Horizontal Collaboration

However, despite these advantages many companies are reluctant to form horizontal partnerships due to the numerous barriers to successful implementation and the difficulty of sustaining the alliance. Langley (2000) considers reluctance within an organisation to be one of the main barriers to horizontal collaboration. Co-operating with a competitor is intuitively counterproductive but Langley (2000) believes logistics companies need to embrace the idea if they are to survive. Huxham (2003) identified the key barriers to collaboration as the lack of common aims, power sharing problems, lack of trust, and the complexity of developing a membership structure for a collaboration.

In a white paper on horizontal collaboration for Unipart Logistics, Arrand (unknown) commented on research by Deloitte that showed that 70 per cent of horizontal partnerships fail. The top reasons cited for this are power difference, opportunism, trust, conflicting objectives and technical implementation weaknesses.

Horizontal collaboration has proved in practice to be difficult to implement and maintain. For example, research on strategic alliances between complementary and competitor organisations by Zineldin and Bredenlow (2003) suggested that as many as 70% of strategic alliances fail. An example provided specific to the logistics industry concerns the collaboration between KLM and Northwest Airlines which led to large losses for both companies.

Arino and Doz (2000) developed a framework to illustrate the main reasons horizontal partnerships fail. This is shown in Figure 2.1.

		Causal attribution of perceived shortfall	
		Endogenous	Exogenous
Nature of perceived shortfall	Efficiency (value creation)	<i>Poor cooperation process (e.g., interface & governance design, cultural convergence)</i>	<i>Deterioration of external conditions diminishing benefits (e.g change in technology, market conditions etc....)</i>
	Equity (value appropriation)	<i>Reframing of interests and valuation of contributions, unbalance in alliance evolution (e.g., share of benefits not in proportion to contributions)</i>	<i>External shift in balance (e.g., change in criticality of respective contributions, new determinants of performance)</i>

Figure 2.1: Mapping expectation shortfalls (Arino and Doz, 2000)

Figure 2.1 shows that internal and external factors can affect the collaboration, with changing market conditions and shifts in balance due to new technologies created by the companies outside of the remit of the partnership both potentially having negative effects. Whilst poor management and planning of the collaboration and changes in company strategy are the main internal factors that can undermine a horizontal collaboration partnership.

Saenz (2012) gave the following three reasons as being the chief pitfalls of implementing horizontal collaboration.

- Problems in synchronizing supply chain processes and its dynamics.
- Impaired supply chain visibility across the shared portion of the networks because one partner is lacking in this area.
- Too much complexity in the supply chain – resulting from increased market volatility, for example – is making it difficult for one or both partners to maintain their commitment to the relationship.

Many companies are unwilling or reluctant to collaborate with competitors at all due to the risk of compromising confidential information (Granot and Susic, 2005). Trust is a necessary ingredient of any collaboration (Grossman, 2004) but is acutely evident in horizontal alliances where direct competitors are concerned.

Collaborative success requires companies to have a culture that is committed to collaboration (Barratt, 2004) as considerable time and resources are needed to establish, maintain and develop a collaboration (Anderson, 2001). This is particularly challenging for, but not limited to, smaller companies, as they are less likely to have the resources and time to undertake such collaboration. Cruijssen et al. (2007a) suggested that the costs of searching for partners and evaluating their fit and reliability have been found to be particularly problematic for smaller companies. If smaller companies do become involved in collaboration they are less likely to have the financial resources and time to find ideal partners, which may lead to lower satisfaction levels or they may only become involved due to being approached by a larger company and their bargaining position may mean they have little control over the project and may end up in a worse position than if they had not collaborated (Bleeke and Ernst, 1995).

Koppenjan (2008) presented three reasons for the difficulty in determining the effectiveness of a horizontal collaboration partnership. These were as follows.

- 1) Collaboration involves many stakeholders who have their own implicit and explicit expectations, interests, objectives and perceptions which will affect their evaluation of the collaboration.
- 2) Collaboration involves companies inputting substantial resources, it can be difficult to evaluate whether the costs of these resources were worth the gains achieved by the collaboration.

- 3) Collaboration involves the development of new ways of working, which may have unforeseen implications and this may lead to the definition of the project scope or objectives.

Perceived or observed opportunistic behaviour by a partner can lead to one partner pulling out of the collaboration. Opportunistic behaviour can include cheating, shirking, distorting information, misleading partners, providing substandard products/services and appropriating partners' critical resources (Das and Teng, 1998).

Emmett (2010) suggests that collaboration can be led into difficulties by the measurement of the wrong factors. This can lead to collaborations failing due to unrealistic targets or due to staff focusing on the wrong priorities. Koppenjan (2008) suggests that in most cases assessment of horizontal collaboration happens in an erratic and unstructured way, using ad hoc performance criteria which each partner develops separately. This can lead to the partners having very different ideas of how successful the collaboration is and what needs to be done in the future to meet the goals of the collaboration. This causes conflict and may even lead to the termination of the partnership.

There have been calls for the stricter monitoring of some forms of collaboration, with global investigations having been carried out into alleged price fixing by major cargo airlines (Zhang et al., 2007). Suspicions of these kinds make it more difficult for other companies to enter in horizontal collaboration due to the negative publicity that will be attracted by further alliances in the industry.

In some industries horizontal collaboration is difficult to undertake within the competition laws, Hingley et al. (2011) suggest in their study of logistics collaboration in the grocery industry that retailers in this industry are unwilling to form horizontal or networked logistics partnerships due to having reached their positions through horizontal mergers, to the point

that only a small number remain and competition between them is very high. Also any horizontal collaboration between them might be seen as against the competition laws and not in the interests of customers or suppliers due to monopoly like conditions.

Retaining the momentum in a horizontal partnership can be difficult with some partnerships being formally announced and then very little happens and the partnership eventually dissolves into nothing. An example of this is the collaboration between Swissair and Singapore airlines in the 1990s which folded after a few years with no real results (Arino and Doz 2000).

A study on the benefits of different types of collaboration by Chan and Prakash (2012) actually showed that in some cases horizontal collaboration projects can have negative effects particularly in terms of individual company flexibility due to commitment of specific resources to the collaboration.

Carbone and Stone (2005) suggest that particularly in the cases where horizontal collaboration is used to allow companies access to additional infra structure, they can only act as an expansion to services temporarily. They also warn that the stronger partner in the alliance may become stronger and can therefore negotiate further bias into the agreement and in some cases may end up acquiring the weaker company. An example of this can be seen in the Railog collaboration between Schenker and Deutsch Bahn which was aimed at improving rail services, this partnership began in 2000 and ended in 2002 when Schenker acquired Deutsch Bahn, integrating it to become DB Schenker (DB Schenker 2012).

Interview based research carried out by Lydeka and Adomavicius (2007) gave the following solutions, suggested by respondents as to how best to overcome the roadblocks and difficulties to horizontal collaboration.

- 1) Only select partner companies where the management is interested in collaborating.

- 2) Appoint a project leader who will take active leadership of the project and will push and coordinate other members of the collaboration as horizontal collaboration requires considerable effort and coordination.
- 3) Look at the collaboration from a business perspective, a number of respondents indicated that personal ambitions can hinder collaboration.
- 4) Build a detailed definition of the collaboration before beginning to collaborate to outline all interests and avoid later conflict.
- 5) Ensuring compliance, to avoid partners refusing to keep to their original promises, respondents indicated that formal agreements should be made.

2.5 Factors Necessary for Successful Collaboration

A considerable number of the papers on horizontal collaboration consider the factors, needed for a company to implement horizontal collaboration effectively or study a particular subsection of factors for example Vilana and Rodriguez-Monroy (2010) focuses solely on the cultural mechanisms whilst Kumar and Seth (1998) focus on control mechanisms. This section will start with a review of individual points made by different authors and will then move on to discuss the different models developed for factors needed for a collaboration to be successful.

2.5.1 Individual Factors discussed in the Literature

The most important factor for any collaboration is that the companies involved share a single/ a number of common goals (Chan and Prakash 2011). Without clear common shared goals, it is unlikely that a horizontal collaboration project will get past the negotiation stage.

Whilst there is significant evidence that companies embarking on a horizontal partnership need to have similar values and processes, Bransetetter and Sakakibara (2002) conclude that if the company's competitive domains are exactly the same, any knowledge sharing

partnership is likely to fail due to the findings being applied to exactly the same market. Chakravarty and Zhang (2007) suggest that complementary expertise is crucial for horizontal collaboration to be successful.

Steinicke et al. (2012) found that in the logistics industry cultural similarity has a larger positive effect on equity based collaborations such as the setting up of a joint venture than on non-equity based collaborations such as freight consolidation

Gulati (1995) suggests that companies are more willing to collaborate with companies who can show that they have been involved in a similar form of collaboration previously, as this suggests that a company is trustworthy and capable of sustaining a partnership.

Previous collaboration expertise can also be attractive to potential partners as it suggests that the company already has the management knowledge to implement and run an effective collaboration, with better day-to-day management and joint leveraging operational knowledge, which in turn leads to lower coordination costs (Sampson 2005 and Hoang Rothaermel 2005).

Through a survey of small Turkish companies, Morris et al. (2007) found that the factors SMEs consider the most important when considering whether to partner with a particular company are whether the company is perceived to be honest and reliable, whether the partner is likely to be loyal to the relationship and honour their commitments.

Steinicke et al. (2012) suggest that an important feature of horizontal collaboration is that managers should, when implementing horizontal collaboration, no longer focus on how to protect their knowledge from their competitors by impeding information flows. For horizontal collaboration to be successful companies need to share information so that the best solutions for all parties are reached.

A study by Cruijssen et al. (2010) suggested that there is a minimum size that companies need to be for horizontal collaboration to be successful, with many respondents indicating

they felt their company was too small to collaborate which they believed to be due to lack of available management time that could be spent on implementing horizontal collaboration. In an additional paper, Cruijssen et al. (2007b) they suggest this may also be due to smaller companies being more likely to operate in niche markets making collaboration more difficult. Oke and Idiagbon-Oke (2010) suggest that it is more common for horizontal collaboration partnerships to display a symmetric balance of power between partners than it is for vertical collaborations to display a symmetric balance of power. It is unlikely that companies would be willing to collaborate with direct or even potential competitors if they thought the other company held the majority of the power in the collaboration. Whereas, in vertical collaborations the larger partner may have the power to force its suppliers or customers to collaborate with it if they want to keep doing business with them (Hingley 2005).

2.5.2 Models for Successful horizontal collaboration implementation

The first model considered in this study is that of Vilana and Rodriguez-Monroy (2010), this is a systematic culture model for implementing successful horizontal collaboration and is shown in Figure 2.2.

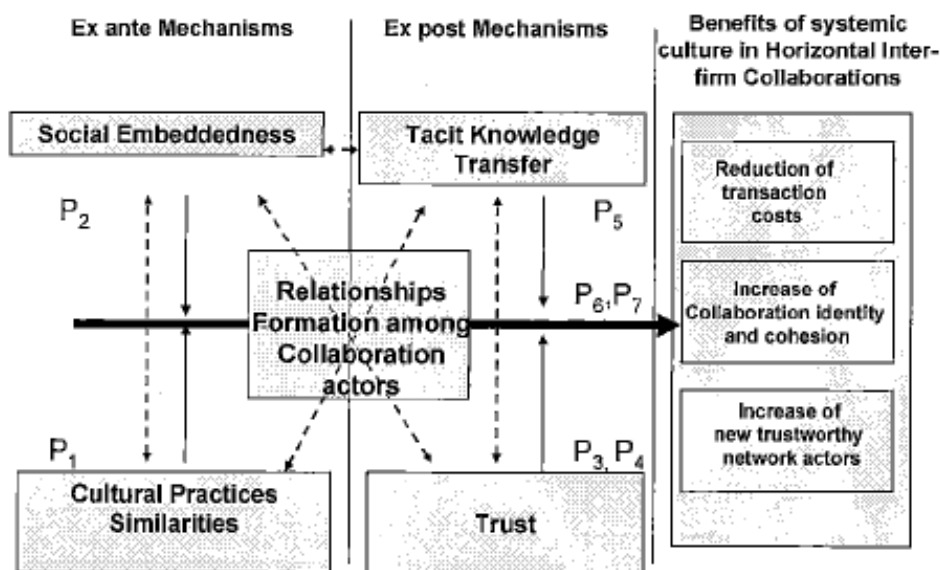


Figure 2.2: Conceptual framework of systemic culture in horizontal inter-firm collaborations (Vilana and Rodriguez-Monroy., 2010)

Figure 2.2 suggests that for horizontal collaboration to be successful there are four main cultural factors that must be met. Firstly, there must be some level of social embeddedness, the companies must have had a certain level of interaction before they will be able to collaborate effectively, this suggests that companies start with small scale collaborations and build up to the more intense types of collaboration. Goerzen (2007) suggests that collaboration between companies is likely to ‘snowball’, with companies collaborating repeatedly and in more in depth projects.

Secondly, there must be some level of knowledge sharing between the companies for any tasks to be carried out and for both companies to benefit from the collaboration. Thirdly, the companies must have some overlap in their cultural practices to allow staff from the two companies to work together. Fourthly, the companies must to some degree trust the other company not to engage in opportunistic behaviour.

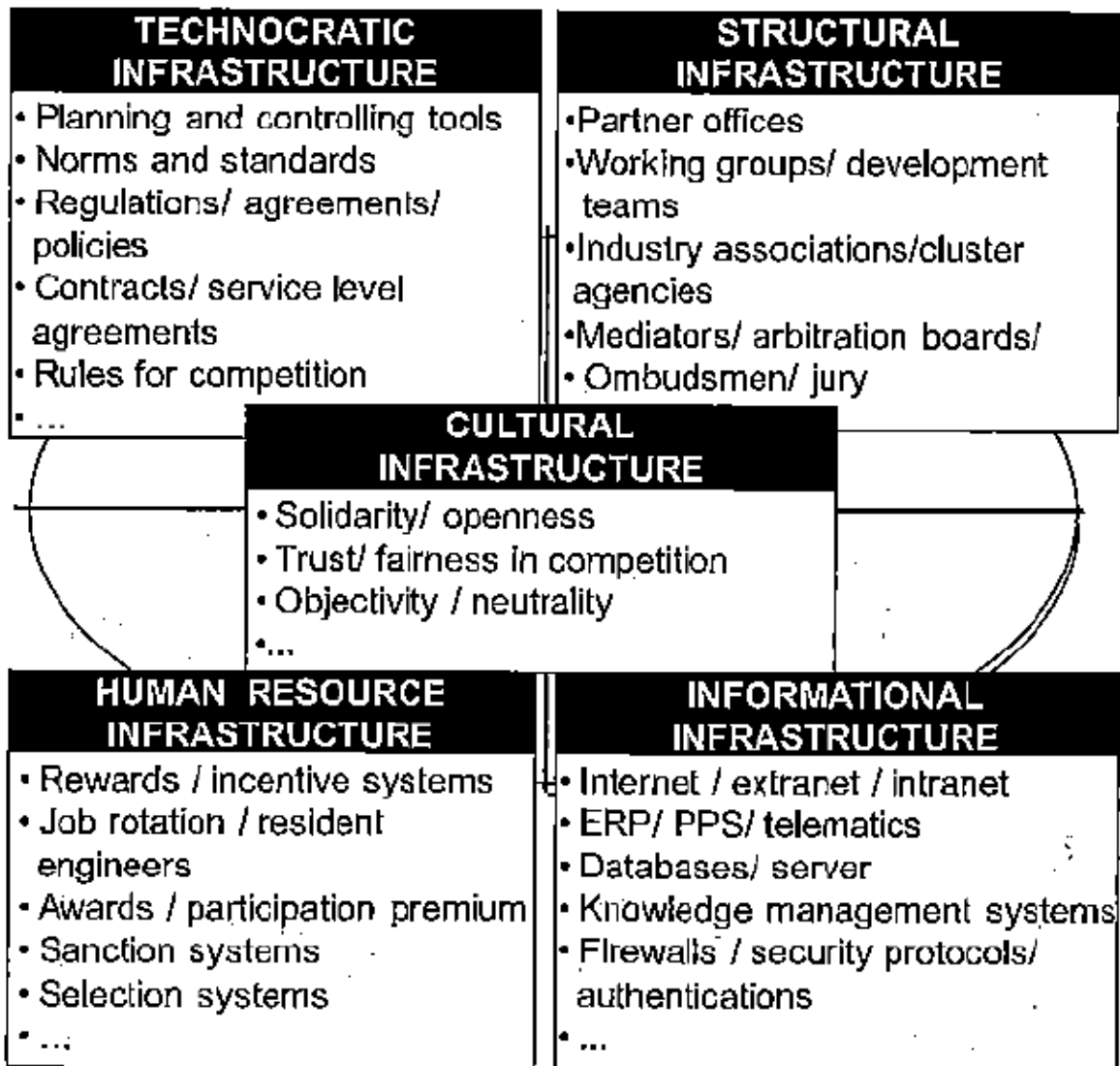


Figure 2.3: Management infrastructures for co-competition in manufacturing networks (Ehrenmann and Reiss 2011)

Figure 2.3 suggests that there are five main factors that companies need to have in place for effective collaboration. Firstly, the collaboration needs technocratic infrastructure which relates to the conditions of the collaboration and the monitoring of the inputs into the collaboration and the results of the collaboration. As mentioned in the previous section measuring the wrong results can lead to failure of the collaboration.

Secondly, structural infrastructure, companies need to identify which parts of their business will be involved in the collaboration and whether any external bodies will be involved.

Vilana et al. (2010) show through case studies that an effective way of dealing with cultural differences between partner companies is for each company to form identical and specific departments to interface with their own company and the partner company

Thirdly, cultural infrastructure refers to the openness and trust needed for a collaboration to succeed. All collaborations need a basic level of trust to exist between the partners for the collaboration to be successful (Blomqvist et al., 2005). There also needs to be a level of openness between the companies to allow for information sharing.

Fourthly, all collaborations will involve some members of the collaborating companies working directly and indirectly on the project.

Fifthly, information systems, many companies have complex information systems to allow customers to view information on their orders. Whether the collaboration is customer facing or non customer facing it is important that the companies' information systems can communicate efficiently. However, it is as equally important for companies that whilst allowing their partners access to collaboration data they do allow them access any data related to the ways they compete with their partner.

Reniers et al. (2010) propose a set of twelve parameters that all companies should consider before entering into a collaborative partnership of horizontal or vertical nature, as these will affect whether or not the collaboration is a success. These are as follows

- 1) Cultural fit, this refers to the human aspects or soft factors of the companies.
- 2) Internal stakeholder support, internal management support and overall company support is needed to avoid conflict on an intra and inter organisation basis through the collaboration.
- 3) Openness between companies, a certain level of transparency is needed in all collaborations to allow the partnerships to function.

- 4) Inter organisational trust
- 5) Former partnerships and experiences
- 6) Level of supplementary/complementary services
- 7) Benchmark results concerning a potential partner, a strengths, weaknesses, opportunities and threats (SWOT) analysis can be useful to check the fit of the partnership.
- 8) External willingness to collaborate, companies must believe that their partners want to be involved and carry on the partnership for it to last long enough to generate results.
- 9) External financial position, companies should check that potential partners will continue to be financially viable.
- 10) External knowledge, there should be the potential for knowledge transfer in any partnership.
- 11) External flexibility, for a collaboration to be successful partners must be willing to adapt and change in order to gain the optimal results and benefits from the collaboration.

The study then went on to survey practitioners to find how the importance of these eleven factors differed across horizontal and vertical collaborations. The most important factors for horizontal collaboration were found to be openness between companies, inter organisational trust, external flexibility and cultural fit between companies.

Ghisi et al. (2008) through interviews with retailers involved in horizontal collaboration identified both a number of criteria needed for collaboration to occur and the four important steps involved in the setting up of a successful horizontal collaboration partnership. The minimum criteria that were identified are as follows.

- 1) Members have to perceive the existence of benefits
- 2) Cultural similarity and common characteristics between members

- 3) Common vision, direction and perspective between members
- 4) Commitment of partners to joint future actions and opportunities
- 5) Willingness to invest in innovation and modernisation

Point 2 is one that has been considered by much of the other literature on horizontal collaboration, with the idea of common vision and direction having been implied or mentioned briefly in the other studies considered. The other 3 points are less commonly cited, although points such as, members needing to perceive the existence of benefits are as obvious and necessary as the commonly cited points. Companies must see both potential benefits and these benefits must be high enough to justify the risk of horizontal collaboration before they will enter a collaboration project.

In the description of point 4, the commitment of partners, Ghisi et al. discuss the need for trust, one of the most commonly cited points and the need for companies to show willingness to make long-term commitments to the collaboration to allow it to develop and grow.

In terms of willingness to invest in innovation and modernisation, companies need to be willing to improve to match their partners standards in terms of technology and systems and horizontal collaboration can often be used to improve both companies effectiveness through the implementation of new infrastructure and management methods.

The four steps that Ghisi et al. concluded were necessary for the creation of a successful collaboration are.

- Stage one, preparation and planning of the alliance. This first stage focuses on defining the focus and characteristics of the partnership. This should include defining who will be involved, what is expected of everyone involved in the collaboration, exactly what resources will be involved in the collaboration. It should involve the definition of the interactions between members and establish communication

channels. It should also formalise the alliance in terms of legal and regulatory documentation and develop measures against which the collaboration can be monitored.

- Stage two, starting the alliance. This stage focuses on developing or adapting internal processes, technologies and infrastructure to support the alliance including the development of best practices.
- Stage three, developing the joint actions. This involves the consolidation of activities into joint activities and the development of these into standard practices allowing for stability in the collaboration to be achieved. At this stage the performance of the alliance, against the agreed measures set up in stage one, should be evaluated.
- Stage four, establishing a long-run relationship. At this stage partners should be looking at ways to sustain and grow the partnership and considering investments in terms of infrastructure or technology to deliver further improvements and allow for closer collaboration.

Possibly the most complete set of criteria that have been developed for companies to consider when choosing partners to collaborate with are those developed by Naesens et al. (2007), which are shown in Table 2.1.

Criteria	Sub-criteria	Elements
Company characteristics	Company structure	Scale
		Decision-taking structure
	Financial structure	Business performance
		Capital required/available
	Image	General reputation
Environmental reputation		
General characteristics	company	Level
		Scope

		Time-horizons
		Previous partnerships
		General culture
Competitive advantages	Product/service	Quality of products
		Quality of services
		Product life cycles
	General competitive advantage	Market share
		Customer loyalty
		Vertical integration
		Technological know-how
Internal processes	Operational	Productivity
		Flexibility
		Control
		Lead-time
		Reliability
		Capacity utilisation
		Total inventory cost
		No. SKU
		Product size
		Inventory turnover
		Quality product/service
		Service level
	Tactical	Investments
		Communication
		ICT Integration
		Decision-taking speed
		Collaborative planning
	Strategic	Customer orientation
		Geographical issues
		Ease exit from market
		Outsourcing strategies
		Defensive/offensive
		Top management involvement

		Shareholder expectations
External parameters	Product/service specific	Complementary
		Supplementary
		Demand variability
		Price elasticity
		Competitive pressure
		Entry barriers
		Technological change
	Industry-specific	Capital intensity
		Financial stability
		Growth potential
		Profit potential
	General external parameters	General business risk
		Inflation rate
		Juridical boundaries

Table 2.1: Criteria, sub-criteria and elements (Naesens et al., (2007))

Table 2.1 considers a large set of criteria which they believed companies should consider for both themselves and their potential partners when deciding whether to collaborate with a particular partner. This framework can also be used to help companies decide at what level to collaborate for example if a fit is seen in only a few elements it might be possible to undertake an informal collaboration that is based on these elements, whereas, if a higher level of commonality between the elements is seen a more structured formal collaboration could be undertaken.

If a horizontal collaboration does hit unavoidable problems, Arino and Doz's (2000) paper on rescuing collaborative partnerships concluded with five things that management can do to try and prevent the collaboration being terminated.

- 1) Understand all the interests your partner has in the collaboration, both initial and emergent. This will help to find common ground to solve the problems.

- 2) Understand the value your partner attributes to intermediate outcomes and see where they differ from the values your company attributes to them.
- 3) If your company value's an outcome as negative inform your partner as they may not be able to see your problem.
- 4) Before blaming your partner, think of other things that could have caused the problem as they may not be entirely at fault.
- 5) If the cause of your troubles is definitely related to your partner, before blaming your counterparts, think of their organisational context and constraints. Although it may seem that they are under committed or have hidden agendas, it may well be that they are being forced by their corporation to take certain actions.

In a study which considered the success of horizontal collaboration solely in SMEs, Hoffman and Schlosser found through survey research the following points relating to alliance success.

- The average level of success of the collaboration decreased considerably when it involved more than one partner. This was understood as being due to the difficulty of managing larger collaborations.
- The rate of success was lower if a foreign partner was involved, thought to be due to SMEs lack of experience in intercultural management.
- The absence of a formulated strategy developed at the beginning of the collaboration has a significant negative impact on the success of collaboration
- However, the companies place in the supply chain, form of collaboration, objectives of the collaboration, configuration of the collaboration and companies market strategy were found to have no significant affect on the success of the collaboration.

2.6 Forms of Horizontal Collaboration

Horizontal collaboration can occur at different organisational levels and can be classified in numerous ways. These classifications consider factors such as the initial relationship between the companies, for example whether they are direct competitors or potential competitors, the level of cooperation in the collaboration, the types of resources shared and the approach to managing the collaboration.

Zinn and Parasurman (1997) considered two factors in their classification of collaboration types: scope and intensity. They defined scope as the range of services included in the collaboration and intensity as the degree of direct collaborative involvement. Intensity is indicated by factors such as the size of assets used in the relationship and the number of workerhours allocated to maintaining the collaboration.

Lambert et al. (1999) identified a hierarchy of partnering articulated by three levels. The first level involved some co-ordination of a single division or activity over a short period of time. The second level is a longer-term partnership involving integration of multiple divisions or activities. The third level involves significant integration over the entire organisation and typically will be set up as a permanent collaboration.

Bengtsson et al. (2010) used the diagram shown in Figure 2.4 to illustrate the two factors they felt were key to assessing the type of collaboration being undertaken. This model is based on two dimensions and takes into account how high the level of competition between the companies is and how high the level of cooperation between the companies is.

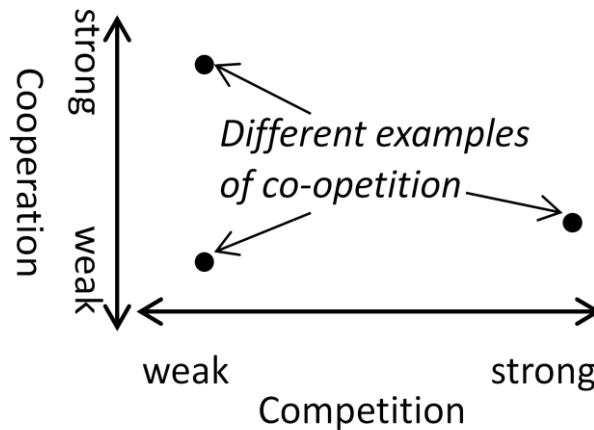


Figure 2.4: Co-opetition occurring in two separate continua (Bengtsson et al., (2010))

Steinicke et al. (2012) based their classification of collaboration types on the structural governance in place in each collaboration, giving them four types of horizontal collaboration.

- 1) Verbal contract based collaborations
- 2) Collaborations with written contracts without equity involvement
- 3) Collaborations with a minority equity base
- 4) Joint ventures

A further paper by Naesens et al. (2007) identifies four levels at which companies can work together. The first of these being arms length partnerships, the second being cooperation, the third coordination and the fourth level full collaboration or alliance. Naesens et al. also suggests that partnerships should start at the lowest level and then grow into the further levels. Anand and Bahinipati (2012) suggest that the focus of the collaboration may also change with time due to industrial and technological development within the partner companies and in the industry generally.

Zentes and Swoboda's (2000) study on retailer joint procurement groups showed that many groups evolve from simply collaborating in the way of joint purchasing to obtain volume

discounts to collaborating to collaborating in terms of delivery services and marketing campaigns.

Collaboration projects can be undertaken as formal alliances in initiatives such as joint ventures or can be informal one-off exercises in the form of aggregated purchasing of infrequently bought items such as trucks. This could potentially explain why there is such a difference in existing cost and benefit sharing models. Langley (2000) provides a discussion on the cost and benefit sharing models of horizontal collaboration initiatives and concludes that all partners in the collaboration must believe gains and losses of the collaboration are being shared equitably among partners. Langley also suggests that as the level of collaboration increases so do the benefits and risks and therefore the importance of having a definite cost and benefit sharing model. The simplest formal cost and benefit sharing model is one in which everything is shared equally.

The literature on horizontal collaboration and co-opetition has identified numerous forms of horizontal collaboration initiatives based on the objectives of the initiative and the physical resources shared such as trucks or supplier information; often different authors have assigned different names to these initiatives. The main forms of horizontal collaboration will be discussed in this section.

2.6.1 Freight Consolidation

Firstly, consolidation of freight is an initiative specific to the logistics function and therefore an important consideration in this study. Cetinkaya and Lee (2002) described freight consolidation as the practice of combining small shipments into one larger shipment to allow a more economical load to be dispatched. This can allow competing companies to aggregate loads to fill, for example, a truck or a pallet saving both companies cost due to higher utilisation. An example of this is the Nistevo collaboration which allows companies to

collaborate in terms of freight consolidation and back hauling (Keskinocak and Savaseneril (2008)).

Whilst freight consolidation occurring between competing companies has received little attention in the literature, many papers have been written that focus on the idea of a logistic company consolidating multiple customers' shipments.

A study by Jackson in 1985 showed that at that time freight consolidation was already a highly utilised strategy by distribution companies, with 84% of respondents suggesting it was very important to them and 16% suggesting it was an important strategy. The study also showed that the reasons companies were using freight consolidation included the reduction of transportation and inventory costs and the decreasing of cycle time. However other respondents indicated that increased cycle time was one of the potential disadvantages of consolidating freight, due to the increased time taken on route.

There have been a number of studies which have tried to classify the different types of freight consolidation that can be undertaken; this section will attempt to present the classification systems that are most commonly used. Figure 2.5 illustrates the 3 types of freight consolidation indentified by Hall (1987).

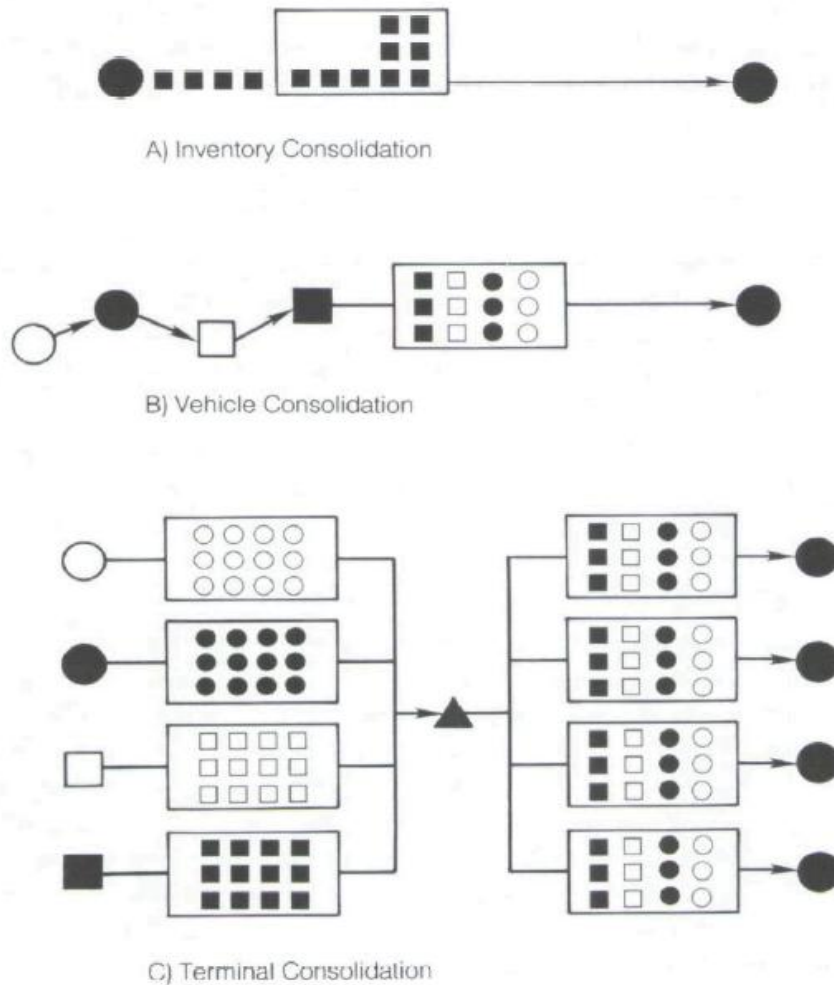


Figure 2.5: Freight consolidation strategies (Hall 1987)

Inventory consolidation occurs when a number of different shipments are transported from and to the same destination in the same load. Hall refers to it as inventory consolidation as it will often require holding inventory until enough shipments are ready to be delivered. In terms of horizontal collaboration, this type of freight consolidation could be used across a trunk route or a scheduled route offered by air or sea freight carriers.

Vehicle consolidation is described as being the “milk run” logistics scenario where multiple shipments are collected and delivered by one vehicle where the route will have been optimised to minimise overall miles, empty running miles or cost.

Terminal consolidation is where multiple shipments are delivered to a central hub or depot and are then sorted and put into new vehicles allowing for each vehicle to pick up from and deliver to a smaller geographical area.

Pooley and Stenger (1992) suggest a slightly different classification of freight consolidation which also consists of three categories.

- 1) Shipment consolidation – this is where small shipments destined for clustered locations are delivered in one full truckload by one carrier.
- 2) Vehicle routing – the shipper has a large number of shipments and a large number of vehicles and therefore selects delivery routes to minimise number of vehicles and total mileage from the base to the drop off points and the return to base.
- 3) Network consolidation – a group of small shipments are carried on a trunk route to a central location and then distributed individually from there.

Pooley and Stenger's vehicle routing is similar to Hall's vehicle consolidation, but only considers the use of this strategy for delivery rather than collection and delivery. Their shipment consolidation and network consolidation categories are similar to terminal consolidation, with both using the idea of re-loading for optimal routes at a central point to allow vehicles to serve smaller geographical areas.

Almost all the literature on freight consolidation focuses on using mathematical modelling and algorithms to solve routing problems, examples include Klinecicz (1990) which develops an algorithm to determine the location of freight consolidation points within a network. Popken (1994) develop a mathematical strategic planning tool to explore the long-term potential of freight consolidation. Bookbinder and Barkhouse (1993) consider a network model which analyses the most economical routes for a small fleet to take to satisfy a number of pickups and deliveries in one optimisation model, this is unusual as most other models

seen in the literature optimise these two sets of transportation tasks separately. Akyilmaz (1994) considers the consolidation of less-than-truckload shipments through the use of an algorithm to minimise empty tonne kilometres. Baykasoglu and Kaplanoglu (2011) use an Economic Shipment Weight (ESW) formula and a computational planning model to make operational decisions on freight consolidation including load acceptance/rejection, load assignment, load re-assignment, vehicle routing and vehicle scheduling.

The majority of literature on freight consolidation concludes that whilst freight consolidation offers substantial benefits these do come at a cost. Wong et al. (2010) suggest that freight consolidation can reduce overall distribution costs and cargo damage but can lead to increased inventory costs, delays and longer routes. Ulku (2012) uses mathematical modelling to prove that freight consolidation can significantly lower carbon dioxide emissions and lead to costs savings of up to 26%.

Krajewska et al. (2007) demonstrated through the use of game theory that considerable cost reductions can be gained from the consolidation of freight with one example showing a 12.46% reduction in routing costs. However, other studies such as Zhou et al. (2010) indicated that freight consolidation does not always provide an appropriate solution, particularly in cases where companies work to short-shipping deadlines. If companies have tight shipping deadlines and cannot afford to wait to allow the partners to completely fill a larger truck between them, the economies of scale aimed for by consolidation may not be adequately reached and it may prove more economical for the companies to operate independently.

One of the major difficulties of freight consolidation is identified and modelled in Ulku (2009), this is the challenge of determining a policy for undertaking freight consolidation that still gives an equal or better service level to the customers in terms of delivery time. If an increased number of companies' orders are being delivered in one consolidated shipment, the

initial collecting of the shipments and end delivery of each shipment may take longer, leading to an increase in lead time seen by the customer.

Freight consolidation also requires careful planning which takes into account weight and volume to allow a balanced mix where heavy and bulky cargos are present. Special requirements such as type of packaging, specific containers and temperature control also need to be taken into account (Leung et al. 2009).

2.6.2 Shared Services

Shared services is a form of horizontal collaboration that is more closely aligned with back office functions; the sharing of these is particularly beneficial to smaller companies as such businesses are often severely constrained in terms of investment (Mesquita and Lazzarini, 2008). Shared services can provide access to resources at lower costs. Research by Goh et al. (2007) found shared services provided cost reductions, increased flexibility, improved quality and the gaining of experience whilst Goold et al. (2001) highlighted cost savings and service improvements.

Examples of shared business functions include accounting, customer support, and billing (Bergeron, 2003), corporate affairs, legal services and human resources (Ulbrich, 2006). Peng and Bourne (2009) details a case in which two hospitals shared training and education programs, a burns care unit and a central laboratory. Bagshawe and Bagshawe (2001) recount a case where a number of companies collaborated to provide a number of training courses to their staff. Soekijad and de Joode (2009) discussed the case of ZEA partners a group of five small European firms formed in 2006 to further develop applications and uses based on a common open software program. By the time Soekijad and de Joode's (2009) research was undertaken this collaboration had grown to nineteen companies situated across ten European countries.

An example of an ICT system based shared service collaboration is the collaboration based around the International Postal System (IPS), which is a software companies can use to track mail from its origin to destination. It was developed by a group of postal companies and is now used by a large number of firms to allow customers to see the progress of international deliveries. Abdallah (2008) identified three levels of collaboration that were occurring through the shared use of this system.

- 1) Passive users, these users acquire the software to be compatible to other providers but do not contribute to development of the system.
- 2) Active users are members of the standards organisational committee and help define strategy and functionality developments.
- 3) Lead active users, these users in addition to being on the standards organisational committee pool resources and capabilities to further develop the software and the service it provides to customers.

The sharing of one particular function is particularly conspicuous in the research; this is the research and development function. Examples include the joint development of the Aygo/C1/107 by Peugeot-Citroen and Toyota (Ichijo and Kohlbacher, 2008) and the Blade collaboration which seeks to expand the blade server market and includes companies such as IBM and Intel (Snow et al., 2008).

A study of small innovative manufacturing companies by Leiponen and Byma showed that 30% of companies were involved in horizontal research collaboration, compared to 40% that were involved in vertical research collaboration and 20% that were collaborating with Universities.

Whilst literature studying horizontal collaboration might be in its infancy, examples of companies entering into this type of collaboration have been around for a long time. In 1948

a group of American Hardware stores started a shared services program which saw them form a co-operative for advertising and purchasing (Slywotzky and Hoban 2007). This now includes 6200 hardware and gardening stores. As well as joint advertising campaigns, the collaboration also allows members to use its customer loyalty programs which would be too difficult and costly for companies to implement individually.

2.6.3 Joint Procurement

Joint procurement is a mature business practice and one that has been studied comprehensively in the literature. Figure 2.6 shows the market share of co-operative buying groups of retailers in a number of EU countries.

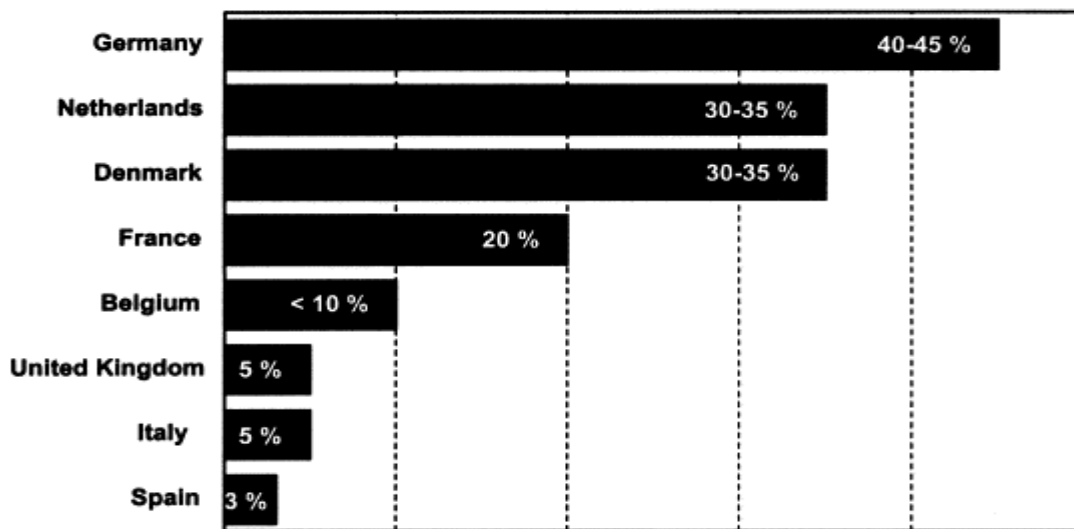


Figure 2.6: Market shares of cooperative buying groups in selected European countries (Zentes and Swomboda 1997 cited in Zentes and Swomboda 2000)

Figure 2.6 shows that whilst joint procurement is a very common practice in Germany, the Netherlands and Denmark it is less common in the UK where only 5% of purchasing is done by joint procurement.

It is also referred to as co-operative procurement (Eriksson et al., 2009), group purchasing (Marvel and Yang, 2008), collaborative procurement (Choi and Han, 2007), collective

purchasing (Schotanus and Telgen, 2007), purchasing consortia (Rozemeijer, 2000) and bundled purchasing (Zhang et al., 2008). Joint procurement can be undertaken in several forms ranging from informal groups that meet regularly to discuss purchasing issues, to the creation of formal centralised consortia for the purpose of managing members' supply activities (Johnson, 1999). Joint procurement can be undertaken both horizontally and vertically. In this research, only horizontal joint procurement is considered.

Joint procurement literature tends to focus on small to medium companies and/or retailers. For example Chen and Roma (2011) studied the impacts of joint procurement between two small retailers under the conditions of them being symmetric retailers (identical buying patterns) and asymmetric retailers (different market base or efficiency). This study showed that whilst symmetric retailers both achieved benefits due to economies of scale, asymmetric retailer collaboration can lead to the benefits being skewed towards the less efficient company due to the drop in competitive advantage seen by the stronger company.

Ghisi et al. (2008) studied small retailer collaboration in Brazil through the use of secondary data and interviews. This study showed that smaller companies undertake joint procurement as a defensive strategy against larger companies rather than as a strategic improvement tool and that many of the companies involved in these collaborations hope that they will be able to diversify and grow the collaboration into other areas.

Shaw et al. (2004) surveyed UK Retailer purchasing groups and found that in addition to the actual joint buying of items, approximately a half undertook joint negotiation with suppliers, one third of them undertook joint order processing, just under a half paid the suppliers jointly and around one third used a joint supplier accreditation scheme. Hernandez-Espallardo (2006) suggested that joint procurement groups can be split into two distinct types, firstly, back to basic procurement groups which focus solely on obtaining discount due to volume consolidation and secondly, value-added buying groups which not only aim to lower supply

costs but also to provide small retailers with other benefits such as joint customer loyalty schemes, distribution networks and marketing programs.

Carney (1992) suggests the primary motivations for retailer joint procurement are that retailers can pool their purchasing requirements to improve their bargaining power and access bulk buy discounts. This basic explanation of retailer joint procurement goes some way to explaining the focus in the literature on small to medium retailers.

Retailing can be defined as the “process of selling goods and services to ultimate consumers, or those buying on behalf of such consumers, particularly when carried out through store outlets and, when further specified, mail order, etc” (Baron et al., 1991). A retailers key functions are to buy and sell, buying makes up a considerably larger percentage of their function than a manufacturer or logistics company, so they are more likely to be interested in ways to optimise this.

In addition to this if the main reason for joining a joint purchasing group is to improve bargaining power and access bulk buy discounts, small companies are more likely to get involved than large companies whose orders may already be large enough to gain discounts.

Advantages of joint procurement can include lower prices due to aggregated quantities (Nollet and Beaulieu, 2005), reduced supply risks, reduced administrative costs due to centralisation of purchasing activities (Wang and Archer, 2007), reduction of overall transaction costs (Minner, 2007), flexibility of inventories (Tella and Virolainen, 2005), improved negotiation strategy and improved insight into market and cost structure (Choi and Han, 2007). Chakravarty (1984) suggests joint procurement is particularly advantageous for multi-item buying due to the savings on order placement costs, the availability of group discounts and the simplification of order control.

Granot and Susic (2005) considered the effect that the growth in internet based supply exchanges has had on joint procurement and showed many examples of competing companies that have chosen to form industry market places in an attempt to cut administrative cost associated with procurement. There examples included Boeing, DuPont, Sears Roebuck, General Motors and Ford.

Joint procurement requires a considerable level of information sharing and collaboration between the companies involved for it be successful. Mudambi et al. (2005) suggested that for joint procurement to be successful long-term contracts and planning are vital, and can involve improved demand forecasting, improved scheduling/delivery standards and stock reviews. Huber et al. (2001) in their study on the impact of electronic market places on joint procurement found that it is of increasing importance for SMEs in particular to build up the technological competencies in terms of purchasing to allow them to obtain the best rates individually to ensure that they are able to join group procurement schemes if they are beneficial to them.

Published literature on this form of horizontal collaboration has considered the problems the growing move towards joint procurement could potentially cause, with the most concerning being the suggestion that joint procurement groups could drive prices down to such an extent that only one supplier would be left in the market at which point the supplier would be more powerful than the purchasing group and could increase prices drastically (Nollet and Beaulieu, 2005). This type of situation could also lead to the barriers to new entrants in the market being prohibitive which may inhibit the introduction of new innovative products.

An example of a joint procurement partnership is that of BMW and Daimler, whose joint procurement programme is estimated to save millions of Euros a year and includes the purchasing of products such as batteries, headlamps and speedometers (Hawranek, 2009). Joint procurement is common in the automotive industry with examples of other major

automotive companies undertaking joint procurement including Chrysler and Fiat, in 2009 Chrysler estimated that they would save \$3 billion in 5 years through supplier optimisation which would see their shared supplier base increase from 52% to 65%. This will be achieved as a 2.5% gross saving for the first 3 years and then a 2% gross saving for the following two years (Hannon 2009). 2012 has seen a new partnership emerge between General Motors and Peugeot Citroen which will see them make combined purchases of around \$125 million per year (Terlep 2012).

Research by Lydeka and Adomavicius (2007) found that in the logistics industry joint procurement was being utilised in the purchasing of machinery and supplies such as fuel, tyres and trucks. Specific examples of joint procurement in the logistics industry include Transplace, which is a fuel procurement collaboration that allows members to negotiate lower fuel prices at multiple locations (Keskinocak and Savaseneril, (2008)).

2.6.4 Joint Ventures

The final form of collaboration considered in this research is joint ventures, sometimes referred to as joint alliances. Joint ventures concern the combination of part or all of the assets of two or more parent firms into a legally separate unit and agree on a profit sharing model for the venture (Balakrishnan, 1993). Joint ventures are used widely around the world; research by Bamford et al. (2004) showed that between 1999 and 2004 over 5000 joint ventures had been established across the globe

Advantages of joint ventures can include access to new markets (Inkpen and Beamish, 1997), gaining geographical or industrial experience (Blodgett, 1991), and knowledge gains from partner firms (Lane et al., 2001). Joint ventures often allow companies to expand into a new market. For example Tesco's involvement in a consortium building shopping malls in China has allowed it to increase its presence in the Asian market (Watts, 2006).

Many studies such as Gartner (1985) and Yiu and Makino (2002), have considered under what circumstances companies will create a joint venture. Harrigan (1988) proposed the framework shown in Figure 2.7 to explain the circumstances needed in terms of demand characteristics for companies to become involved in a joint venture.

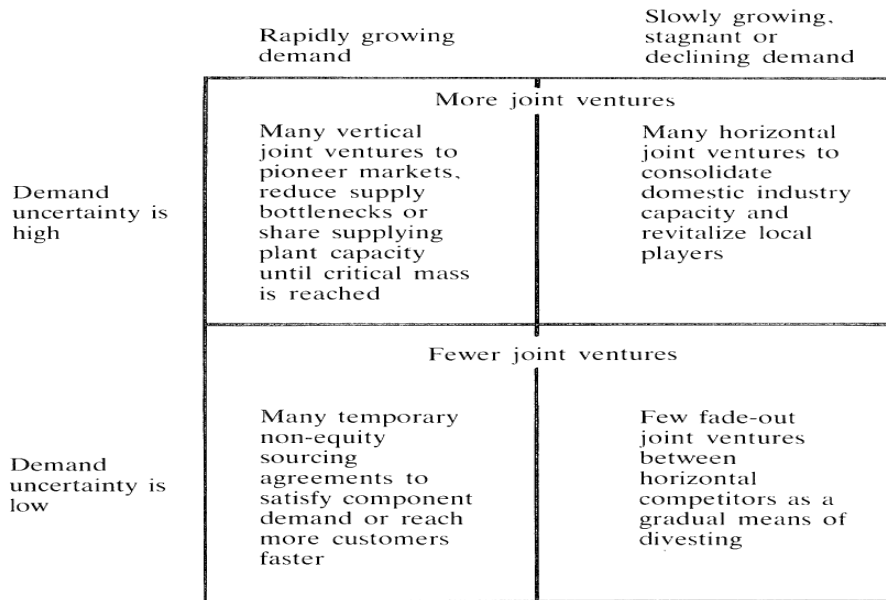


Figure 2.7: Effect of demand uncertainty and growth on joint venture formation, assuming firms will co-operate (Harrigan 1988)

Figure 2.7 illustrates that horizontal joint ventures are only likely to be created in situations where demand growth is at best slow and demand uncertainty is high. In the introduction to the 2012 FTA report on the UK Logistics industry, the chief executive of the FTA commented that “Following a prolonged period of downturn in the economy, and with forecasters telling us there is little prospect of significant growth in the coming year, we continue to face tough times. Volatility and uncertainty in world markets, especially for our trading partners in Europe, makes for a cautious approach” (Pencier, 2012). The logistics industry in the UK is experiencing both a downturn in freight and high levels of uncertainty in terms of demand for individual services. This according to Harrigan’s, framework puts

logistics companies in a position where they are likely to consider participation in joint ventures.

A survey of collaborations in a number of manufacturing industries carried out by Hung and Chang (2012) found that companies were more likely to undertake joint ventures than other types of horizontal collaboration if they are operating in industries that have higher technological volatility. This was thought to be due to the strict controls imposed in this type of collaboration due to the need for legally binding contracts in the set up of a joint venture. Another reason why this type of collaboration might be preferred in a volatile environment is that a joint venture separates out the collaboration slightly from the company as it involves the creation of a new entity. Whilst the logistics industry may not be experiencing high levels of technological change it is experiencing high levels of turbulence and uncertainty which is thought to be caused by a combination of intensifying globalisation, stronger competition, higher customer demands and resource scarcity (Gracht and Darklow, 2010).

A substantial portion of the literature deals with joint ventures between companies with operations in different countries. For example Hennart (1991) studied Japanese joint ventures in the USA, Lyles and Salk (1996) looked at Hungarian joint ventures, Lee and Beamish (1995) studied South Korean joint ventures and Glaister and Buckley (1997) considered joint ventures in the UK. A considerable number of studies focus on China such as Beamish (1993), Goodall and Warner (1997) and Luo (1997).

Foreign joint ventures can provide differing advantages for the domestic and foreign company. In a survey of Russian-foreign joint ventures, Fey (1995) showed that the Russian companies were entering the joint ventures primarily to obtain capital and gain technical expertise, whereas, foreign companies were entering into joint ventures to position themselves well in the Russian market for the future and to take advantage of cheap skilled labour. In these cases the companies have complementary needs and the foreign companies

are able to help their partner company gain the capital they may not be able to get from investors or loans, whilst, joint ventures allow foreign companies to gain exposure to a new market with lower investment levels (Hennart, 2006).

Hamel et al. (1989) theorised that the concept of joint ventures was created due to companies being unable to expand either their product range or geographical markets due to lack of available funds. Yiu and Makino (2002) add to this that in foreign joint ventures, the domestic firm can provide local knowledge which the foreign firm would struggle to establish a successful presence without.

In the case of San Benedetto described in Bonel and Rocco (2007), San Benedetto used its superior production technology to attract partners for foreign joint ventures allowing it to expand into new markets from a dominant position due to its superior technology giving it a high bargaining power when setting up joint ventures.

Lu (1998) advised that partners should primarily be chosen for their complementary resources or skills. In terms of joint ventures, Hill and Hellriegel (1994) defined complementary as being “the extent to which the joint venture partners bring non-redundant distinctive competencies”. Differing competencies can allow companies to build a joint venture built on the best of both companies and allow them to learn from one another. Lu (1998) also suggests that the other desired attributes used in partner selected can be divided into three categories as shown in Figure 2.8.

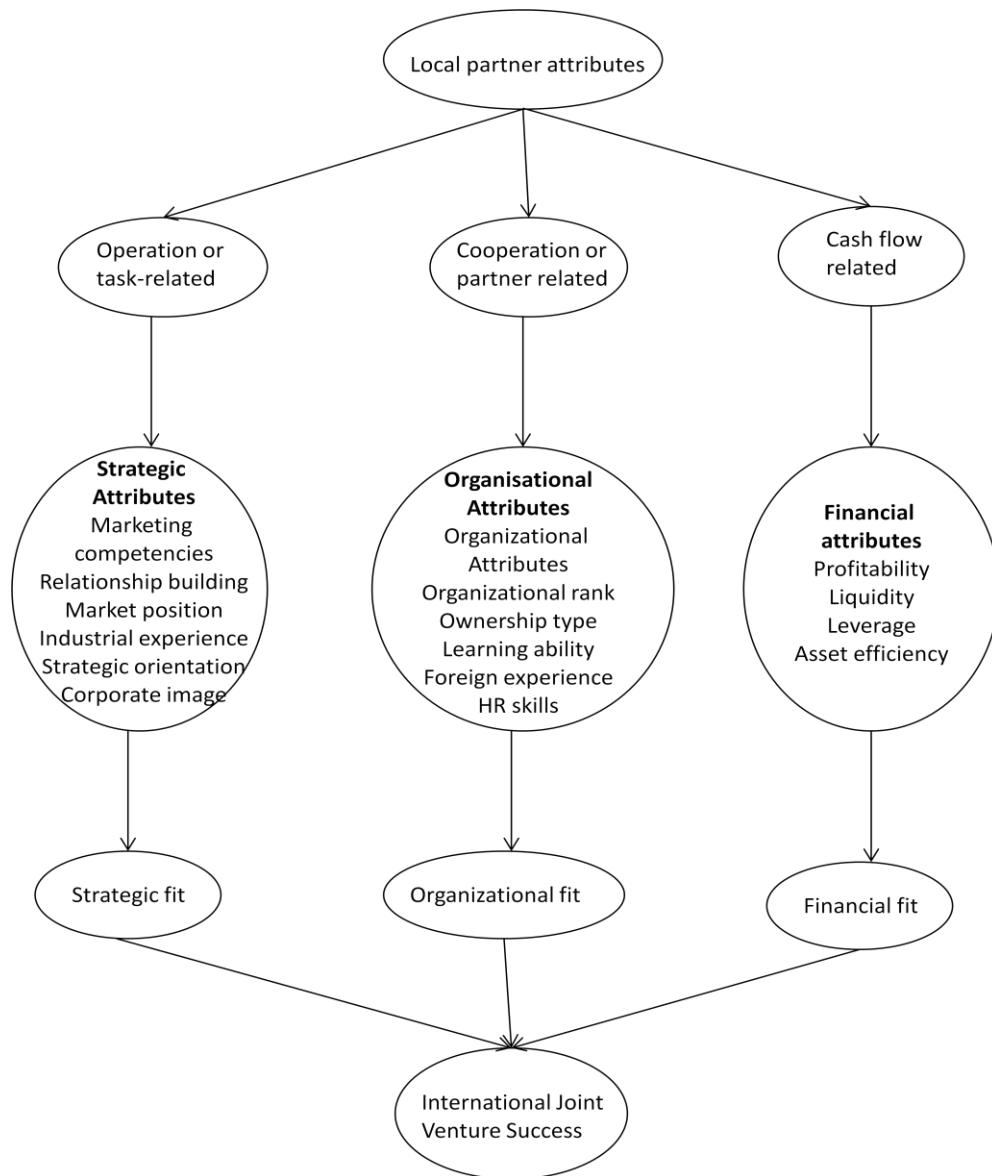


Figure 2.8: Partner attributes and joint venture success: A three-fold classification scheme (Lu 1998)

Figure 2.8 illustrates that companies should look for strategic, organisational and financial fit between themselves and their partners. Strategic attributes can include previous collaboration experience, corporate image and the strength of their market position. Organisational attributes include the structure of the company and its leadership, its human resources skills, learning ability and culture, it has already been seen that many forms of collaboration rely on cultural fit. Financial fit is based on asset efficiency, profitability, liquidity and leverage to

ensure that the partner company is financially stable and that the company will not end up having to try and prop up a failing joint venture due to financial problems with the other company or be unable to make the most of the joint venture due to the other company/ies inability to raise capital for joint investments.

Gerringer (1991) concluded from a survey into partner selection in joint ventures that managers must analyse their own company's resources and skill sets and then identify and rank any weaknesses and use this ranking to choose potential partners. Madhok (2006) suggested that joint ventures may also be formed due to legal restrictions on ownership and government incentives for example tax breaks.

A survey of success factors in joint ventures in China by Hu and Chen (1996) found that the success of joint ventures with a foreign partner is more dependent upon partner-related factors such as commitment and number of partners, rather than environment-related factors such as product characteristics and demand patterns. This suggests that Harrigan's (1988) framework is more suitable for analysing the potential for domestic joint ventures as there are more important factors than demand characteristics at play when international joint ventures are being considered.

Pothukuchi et al's. (2002) study into cultural difference and joint venture performance found that cultural difference generally have a negative impact on the performance of a joint venture as it causes conflicting expectations and misunderstandings. Whilst Swierczek (1994) illustrated that cultural difference can cause problems right from the beginning of the negotiations, this is due to the difficulty in setting objectives and making compromises due to differing assumptions of subtext and agreements attached to these.

Hoffman and Schlosser (2001) considered there to be five stages in the life cycle of a joint venture and twenty four variables which affect these five stages. The five stages are strategic

analysis and decision to co-operate, search for a partner, designing the partnership, implementation and management of the partnership and termination of the partnerships.

The variables that underpin the success of the strategic analysis and decision to co-operate stage are the level of strategic flexibility and a limited need for control, the potential of partners to contribute complementary or similar resources, thus a good knowledge of their own company's strengths and weaknesses. The early setting of the joint venture objectives in close relation to the company's business strategy, to ensure that the joint venture fits with company goals can also influence the success of a joint venture. The last factor at this stage is the awareness of time requirements for joint venture development. Due to the high level of complexity in setting up a joint venture, companies must be patient and not expect joint ventures to yield significant results for a considerable time period, often measured in years.

At the second stage, searching for a partner, success can be gained by building on existing partnerships with known companies or choosing partners with a successful track record for collaborating, looking for companies with complementary skills and resources and by considering the cultural fit of potential partners.

To allow for the successful designing of the partnership, precise definition of rights and duties of each partner needs to be assigned and in most cases these need to be equal contributions and gains for each partner. Partners must ensure that they keep and protect their core competencies in these agreements and the partnership emphasises the potential for joint growth creation. At this stage companies should also ensure that they are building trust by unilateral commitments to ensure the partners are able to work successfully together and to avoid opportunistic behaviour.

The important factors at the implementation and management stage are the establishment of an information co-ordination system to efficiently link the joint venture company to its parent

companies. Partners should also ensure that they monitor data flows to ensure no unwanted transfer of knowledge occurs. The exact physical resources and employees, from each company that will be involved in the joint venture, must be determined and top management support must be gained to ensure continuing commitment.

Companies should use this stage to learn from one another's processes and procedures, to allow them to improve their own internal operations and systems away from the joint venture. An ongoing review of the joint venture's performance should also be set up to ensure the objectives are met.

At the termination of the partnership, the key factor is to find a way to dissolve the partnership on good terms, to allow for further collaborations to take place. This involves ensuring that plans for termination were made in the conception stage and that termination only occurs on the approval of all partners.

Koh and Venkatraman (1991) classified the potential costs of setting up joint ventures into three categories; these are coordination costs, costs attributed to erosion of competitive barriers which can occur when a competitor becomes stronger through the transfer of experience and market access obtained from the joint venture and the costs associated with the creation of an adverse bargaining position. The creation of an adverse bargaining position can occur if one partner is able to negotiate a larger portion of the share of the joint venture due to specialised or irreversible investments.

Often cited examples of joint ventures include the European aircraft joint venture, Airbus, where members of the venture specialise in the development and production of different components (Mowery et al., 2002) and the joint venture between Fujitsu Siemens Computers, GE and AVIC which was formed to develop avionic systems (Ehrenmann and Reiss, 2011).

Whilst joint ventures may provide significant advantages in some situations, Agarwal and Ramaswami (1992) highlight that the lack of total strategic control by a single company may not allow the joint venture to have the flexibility that is needed to secure long-term global competitiveness. Another issue is that studies such as Fey (1995) and Groot and Merchant (2000) found high rates of joint venture failure with quantifications of these failure rates being anywhere from 37% to 70% (Geringer and Herbert, 1991). This suggests that many companies are not able to successfully undertake the steps outlined previously.

Notable joint venture failures have included that of the joint venture between Ciba and Corning which was terminated when new technological developments led to a perceived imbalance in Ciba's favour which led to Corning's divestment from the joint venture. Another example which has received considerable attention in news articles is the joint venture formed in 2007 between Tiffany and Swatch. This joint venture was set up to develop, produce and sell Tiffany branded watches broke up in 2011 due to low sales, however both companies are trying to sue each other and this battle is continuing. Swatch Group, the world's largest watchmaker, faulted Tiffany for "systematic efforts to block and delay development of the business." Tiffany in turn has said that Swatch did not honor the terms of the agreement, including providing adequate distribution (Wahba 2012).

Joint ventures in logistics can be undertaken by dedicated logistics companies or by collaboration between logistics departments of other types of company. For example, Penske Logistics is a joint venture between GE Capital Services and Penske Corporation, (Berghlund et al., 1999). Sinotrans, China's most comprehensive domestic logistics provider, provides its wide range of services by being involved in many domestic and international joint ventures (Jiang and Prater, 2002).

2.7 Buyer led and buyer-encouraged collaboration

Whilst horizontal collaboration requires collaboration between direct or potential competitors, literature has shown that in some cases, the collaborations are not controlled and run by the companies actually collaborating but by a customer or 3rd party.

Wu and Choi (2008) described a number of different cases, when multiple suppliers are being used and interaction or collaboration is occurring between the suppliers. A summary of each of the types of relationship they saw is given below.

- Coach: this relationship is characterised by the use of two suppliers to reduce the risk for the buyer. In this case, the buyer uses a local long-term supplier with which they have a close relationship with and a new larger supplier. The suppliers are encouraged to share information allowing the smaller, long-term supplier to gain technical knowledge, whilst the new supplier gains tacit knowledge of the buyer.
- Flip-flop: this is characterised by the buyer bringing in a second supplier to reduce its dependence on the initial supplier and dictating that supplier one will undertake some of the management of the procurement of parts/sub assemblies from supplier two. This leads to a low level of information sharing, particularly flowing from supplier one to supplier two. There is very little advantage of this situation for supplier two, however, supplier one will gain some business maturity due to the management tasks it will undertake.
- Hands-off: in this case the buyer had a large supplier base which they have been reducing in an attempt to reduce costs. They have also put pressure on their remaining suppliers to cut costs. Independently of the buyer the remaining local suppliers formed an alliance in an attempt to increase their power against the buyer. This was chaired by the largest supplier which is now the only company that interacts with the buyer, as all quotations and requests are handled through this supplier. This

strengthened the suppliers' position but had mixed reactions from the buyers who acknowledged that this streamlined their processes and had reduced their transaction costs, but the increase in supplier power does give them cause for concern.

- Mediator: in this case the buyer wanted to consolidate its logistics functions to just two suppliers and task them with more value-added services. The company was nervous about trusting one supplier with the entire task, so chose two competing companies and instructed them that they had to work collaboratively, giving each company 50% of the business. This forced the suppliers to collaborate in terms of information sharing so that they could synchronise the services they were providing to the buyer. This has led to an uneasy collaboration which the buyer has had to invest a considerable amount of time in managing due to the fact that both suppliers are hoping that they may eventually win the sole contract for these services.
- Organiser: this company set up a complex bidding process for potential suppliers of new testing equipment which involved them having to solve technical problems and involved forums where suppliers exchanged their ideas. All the suppliers felt that participating in the forums was necessary to understanding the buyer's requirements and each supplier submitted their individual proposals sometime after the forums. Whilst a single supplier was chosen for the buyer's contract, the companies involved in the forums viewed them to be so beneficial that informal information exchanges between the suppliers have continued.
- Plotter: originally this company used one single supplier to supply nine different assemblies, when it felt the relationship was lagging, they asked a number of potential suppliers to supply quotes for all the nine assemblies. Their original supplier gave them the best quote for all but one of the assemblies. The buyer now operates a

similar system as the 'flip-flop' scenario, this was categorised separately as the situation arose for different reasons.

- Puppeteer: in this situation the suppliers keep to almost traditional competitive roles, with some information sharing due to the fact that the buyer holds review meetings with both companies at the same time and encouraged the two suppliers to locate next to their own premises, this leads to casual interactions between the staff of the two suppliers' due to the fact they will see each other regularly due to geographical proximity.

It can be seen from these examples that in some cases these collaborations are very strongly led by the customer and suppliers have little choice but to collaborate, in other cases the customer simply provides the suppliers with the space or reason to collaborate.

Examples of this include Toyota, which encourages its suppliers to collaborate in terms of knowledge sharing, allowing suppliers to benefit from knowledge spill over and thus benefitting Toyota as they have suppliers which are on the cutting edge in terms of production efficiency and innovation (Lazzarini et al., 2008). Sako (2002) considered the supplier improvement programmes run by the large Japanese automotive manufacturers, Toyota, Nissan and Honda. This study showed that they all helped their suppliers improve through joint learning with other suppliers in forms such as workshops run for their key suppliers and joint problem solving exercises.

An example of this practice in a different setting can be seen at DHL, which has a UK system that allows its suppliers to share networks, processes and systems Naylor, (2010). This was developed by DHL to promote collaboration between its suppliers allowing for them to provide a seamless service to their customers, with one single information point.

Dubois and Fredrikson (2008) undertook a case study on what they described as a Volvo led triad, where Volvo are promoting competition and collaboration between two of their seat assembly suppliers, Johnson Controls Incorporated (JCI) and Lear. Both suppliers provide similar services with Lear being responsible for the development of all rear seats for one type of car and for the assembly and delivery of all seats to Volvo's plant in Gothenburg. JCI is responsible for the development of all seats for a second type of car, and the front seats for the first type of car, and for the assembly and delivery of all seats to Volvo's plant in Ghent. Volvo expect JCI and Lear to collaborate in terms of product development and scheduling to ensure the right products get to Volvo's production line. Volvo, whilst promoting competition between the two suppliers in terms of contests to improve assemblies and design new parts do try to keep the volumes allocated to each supplier roughly equal.

There has also been a small number of papers that have considered the idea of government encouraged horizontal collaboration, Breznitz (2009) describes the Israeli Governmental policies that have encouraged horizontal collaboration in the IT industry to promote stimulation and capability increase in the industry through collaborative research and development grants.

2.8 Introduction to the Logistics Industry

The Oxford English dictionary (2012) defines logistics as “the detailed organization and implementation of a complex operation.... the commercial activity of transporting goods to customers”.

The Chartered Institute for Logistics (CILT) in the UK expands on this definition by defining logistics as “getting the right product to the right place in the right quantity, at the right time in the best condition at an acceptable cost” (CILT UK 2010). This can involve a wide range of activities including transportation, warehousing and planning.

The Council of Supply Chain Management Professionals (CSCMP) (2010) definition of logistics management activities includes 'inbound and outbound transportation management, fleet management, warehousing, materials handling, order fulfilment, logistics network design, inventory management, supply/demand planning, and management of third party logistics services providers. To varying degrees, the logistics function also includes sourcing and procurement, production planning and scheduling, packaging and assembly, and customer service. It is involved in all levels of planning and execution--strategic, operational and tactical.' Their definition continues to describe logistics management as an integrating and coordinating function.

A considerable amount of attention had been paid, in academic literature to defining and separating the terms logistics management and supply chain management. In a discussion on the difference between the function of logistics and supply chain, Lummus et al. (2001) concluded that 'the logistics profession involves planning, implementing and controlling efficient, effective flow and storage of goods and services from the beginning point of external origin to the company and from the company to the point of consumption for the purpose of conforming to customer requirements'.

Rao and Young (1994) classified the logistics functions into a number of categories as described below.

- Planning functions including location selection, supplier selection, supplier contracting and scheduling.
- Equipment functions such as selection, allocation, sequencing, positioning, inventory control, ordering and repair.
- Terminal functions incorporating gate checks and location control.

- Handling functions accounting for pick-up, consolidation, distribution, expediting, diversion and transloading.
- Administrative functions which include order management, document preparation, customs clearance, invoicing, inventory management, performance evaluation, information services and communications.
- Warehousing functions such as receiving, inventory control and reshipment.
- Pre/post-production activities for instance sequencing, sorting, packaging and postponement.
- Transportation functions like modal co-ordination, line haul services, tracking and tracing.

Manufacturing and retail companies may choose to retain the logistics function within the company or may choose to outsource some or all of the tasks to a dedicated logistics provider. Different logistics providers will provide different ranges of services in terms of geographical coverage, delivery modes, warehousing facilities, planning capabilities and value added services.

The literature on logistics uses many different terms and classification sets to define different logistics companies. Lai (2004) used a classification set that split logistics companies into four different categories based on three characteristics. Firstly, the level of value added services which the company can provide. Secondly, the level to which they can provide technologically linked services and thirdly, their freight forwarding abilities. The four types of company that were derived from their analysis were as follows.

- 1) Traditional freight forwarders characterised by a high level of freight forwarding competencies but low levels of the other types of competencies.

- 2) Transformers, these companies have high levels of freight forwarding and technological capabilities and medium value added competencies.
- 3) Full service providers, this type of company has a high level of all the competencies.
- 4) Nichers characterised by low freight forwarding capabilities and medium levels of the other capabilities, these companies tend to focus on niche markets such as warehousing, order processing and information management.

Delfmann et al. (2002) used an alternative approach in their classification of logistics companies. Their classification system considered the way the services are offered focusing on integration of services and customisations. The three types of logistics service provider (LSP) they identified were.

- 1) Standardising LSPs which offer specific and individual transportation and warehousing services.
- 2) Bundling LSPs which offer bundles of standard services centred on a core logistics activity such as transportation with additional services such as simple assembly or quality control. These companies offer a range of bundles but do not customise them to individual customers.
- 3) Customising LSPs offer core logistics activities, coordination, administration and value added services not usually associated with logistics. Each customer's bundle of services are customised to that specific customers requirements.

A third approach to the classification of logistics companies is undertaken by Persson and Virum (2001). This classification is based on the complexity and specificity of the services offered by LSPs. This classification set is shown in Figure 2.9.

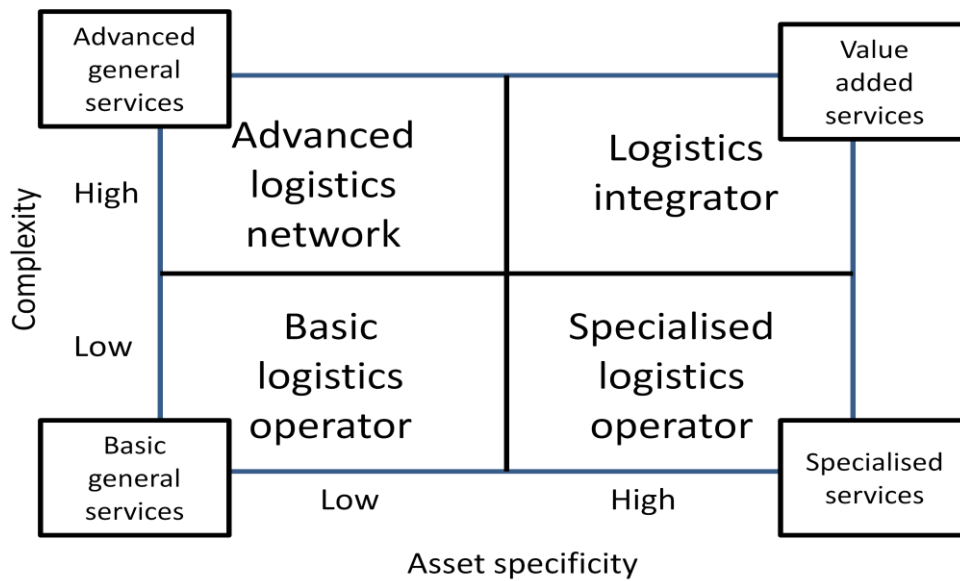


Figure 2.9: Different types of LSPs (Persson and Virum, 2001)

In addition to these classification sets, there are many papers that have studied a particular type of logistics company, Lieb (2005), Sakay and Mohan (2006), Rafiq and Jaafar (2007), Hamdan and Rogers (2008) and many others have written papers which solely concentrate on the types, competencies and effectiveness of 3PLs. Mukhopadhyay and Setaputra (2006), Win (2008) and Buyukozkan and Feyzioglu (2009) all conducted studies into the competencies of 4PLs. Murphy (2001), Liang et al. (2006), Markides and Holweg (2006) and Tongzong (2009) all considered the services offered by freight forwarders. Whilst Evers and Johnson (2000), Premeaux (2002) and Makukha and Gray (2004) all published studies that centred on shippers.

This research will use the following terms and definitions as they are well known terms both in academia and industry. Firstly, a 3PL is a company that provides all or a significant proportion of a company’s logistics needs in terms of distribution, warehousing and customs clearance. In contrast to this, a 4PL is considered to be “a supply chain service provider that participates in supply chain co-ordination rather than operational services” (Van Hoek and Chong, 2001). 4PLs have more of a co-ordination role than 3PLs and subcontract some of the

actual operations to 3PLs. Freight forwarders and shippers are responsible for the movement of the goods with freight forwarders tending to be responsible for part of a route and will often be used by shippers to do the first and last parts of the distribution phase. Shippers provide a range of transport solutions and can be responsible for the full transportation route; some of the actual transportation may be outsourced depending on their resources.

2.9 Horizontal Collaboration in the Logistics Industry

Literature reviews on horizontal collaboration in logistics have concluded that the subject has only been documented adequately in certain areas. Cruijssen et al. (2007) suggested that maritime shipping is the only area that has received significant attention in the literature to date. A number of studies, however, have provided examples of how horizontal collaboration is being undertaken and the benefits of these collaborations.

Examples of collaborative purchasing in logistics include fuel programmes under which companies negotiate fuel prices as a group to gain lower prices (Keskinocak and Savaseneril, 2008). Alliances in the container terminal operating sector have facilitated greatly enhanced operating efficiencies and wider ranges of services to customers (Cheung et al., 2003). A study by Berger and Bierwirth (2010) demonstrated through the use of computer simulation how collaborative approaches to planning transport and freight consolidation can achieve higher network performance.

A survey carried out by the Eye for Transport agency within the European Logistics industry indicated that respondents believed that horizontal collaboration in logistics could cut costs and enhance customer service (Eye for Transport, 2010). Horizontal collaboration in logistics can also allow access to new markets, when partners are located in a different business or geographical area and allow companies to learn from each other (Bernal et al., 2002).

In terms of planning and forecasting, collaboration between logistics companies is being facilitated via logistics exchanges offered by companies such as Nistevo, Elogex and Transplace. Successful use of these platforms has shown savings of up to 19% for companies involved in the collaboration (Ergun et al., 2007).

European Logistics Users Providers & Enablers Group (ELUPEG) was founded in 2002 with the sole aim of promoting horizontal collaboration in logistics in Europe. The group has 679 members (ELUPEG 2012) including logistics providers and manufacturers and retailers with logistics capabilities. The aim of the group is to collaboratively improve European logistics through action based projects.

Onoyame et al. (2008) proposed two general types of horizontal collaboration in the logistics industry. These relate to whether the collaboration takes place in the construction phase or the scheduling phase. Collaborations in the construction phase include joint procurement and any form of joint strategic planning. Collaborations in the scheduling phase refer to operational collaborations such as freight consolidation. This classification does not adequately classify all types of collaboration being undertaken in the logistics industry as it does not take into account sharing of back office services and many joint ventures would fall into both sections of the classification.

Vestrepen et al. (2009) developed a classification set of horizontal resource sharing programs that can be undertaken in the logistics industry, these are shown in Figure 2.10.

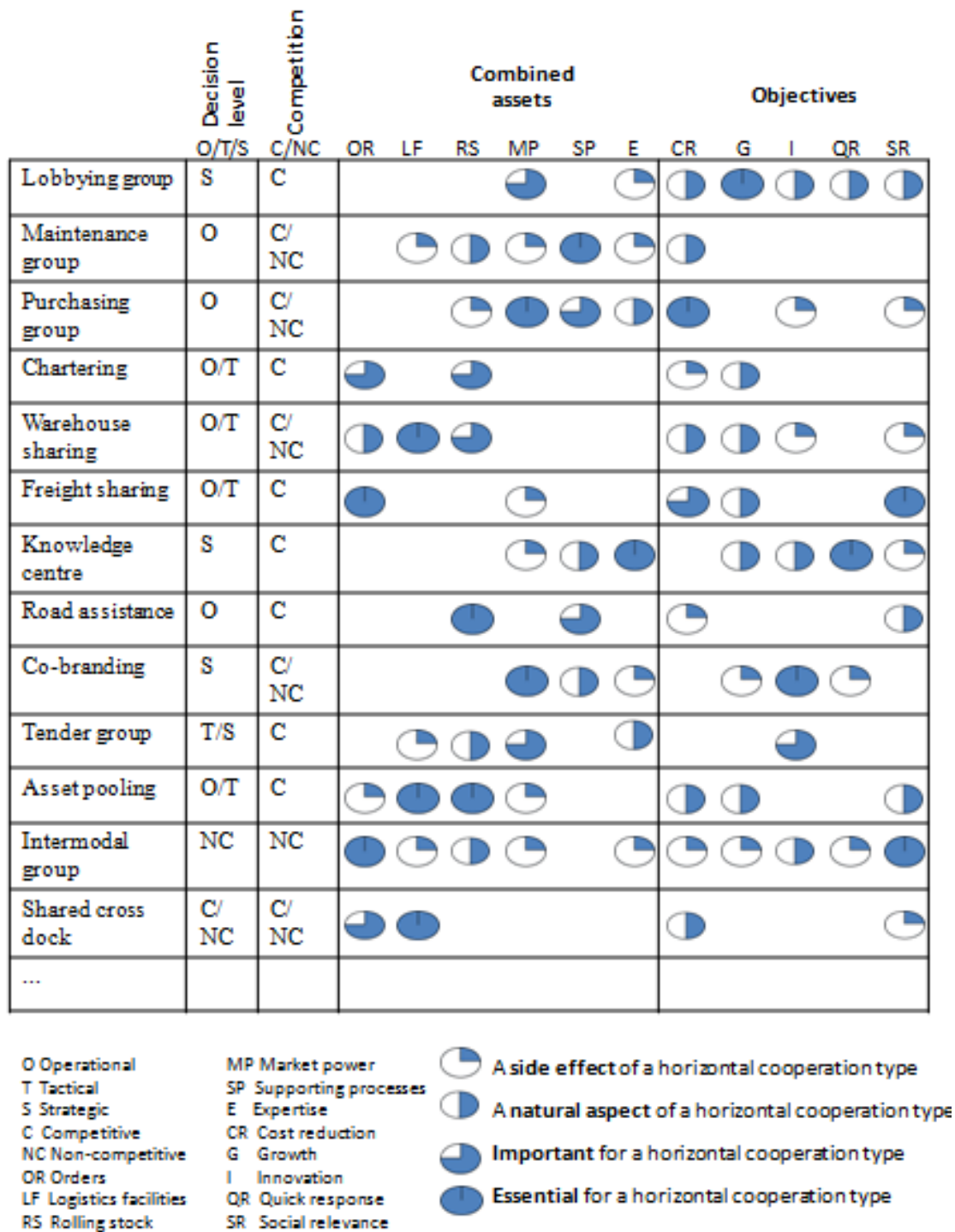


Figure 2.10: Classification of cooperation (Vestrepn et al., 2009)

Figure 2.10 shows a number of different horizontal collaboration initiatives that have been seen in the logistics industry along with the essential resource that are needed for these types

of collaboration, the resources that will be needed to support these and the reasons that these each type of collaboration is entered into.

This section will discuss the ways horizontal collaboration is being undertaken in different sections of the logistics industry and by different types of logistics providers.

2.9.1 Airfreight Providers

Certain sectors of the logistics industry have embraced horizontal collaboration more than others. For example, many airlines work together in alliances to allow their cargo transportation operations to service more airports. Not only is this practice common place in today's air freight industry but it also a mature practice in the industry, a study by Oster and Pickerell (1986) reported that by 1985 nearly all of the top 50 commuter carriers were involved in a code-sharing alliance.

An example of this is the SkyTeam Cargo alliance consisting of Air France- KLM, Delta Airlines and Korean Air (Morrish and Hamilton, 2002). Airlines also collaborate to enhance customer service on passenger routes. These collaborations can increase customer satisfaction and allow airlines to enter new markets. For example, through the One World Alliance, customers can book round the world flights through the use of twelve airlines' routes.

Wong et al. (2010) proposed that the airfreight industry has come to rely on horizontal collaboration due to an increase in the services expected from airfreight carriers. Historically airfreight forwarders provided point-to-point transportation with customs clearance and some storage services to a small number of large customers. Now they are expected to provide total logistics solutions to a wide range of customers with wide ranging needs including tight schedules, impromptu changes and special requests.

Freight consolidation is particularly important in the air freight industry due to the discount given for larger shipments. Li et al. (2012) found that bulk discounts are often calculated

through the use of break points rather than incremental scales, meaning that freight forwarders will often over-declare the weight of a shipment if it is close to the breakpoint in order to obtain the discount. The paper carries on to suggest that many freight forwarders use consolidation to obtain these discounts, particularly to get them over the 400kg break point, which is generally used as a key break point.

In a Delphi study investigating the future of the aviation industry, carried out by Linz (2012), respondents indicated they believe there is an 80.3% probability that the trend for freight consolidation in the air freight industry will continue. This probability was reached with an inter-quartile range of 15, which is less than the critical cut-off point of 30, allowing for it to be concluded that the respondents had reached a consensus on this issue.

2.9.2 Road Freight Providers

Verstrepen et al. (2009) conducted a study of Flemish logistics providers' views on horizontal collaboration; 80% of the road freight providers indicated that they believed horizontal collaboration increases the companies' productivity on core activities. It can be deduced from this that road freight providers see horizontal collaboration as a strategic tool to improve efficiency and that they are potentially willing to collaborate in their core competencies.

Examples of collaborations between road freight providers include NetExpress Europe which was established in 2001 by Calberson (French), Gel Logistik (German), Schiphol Express (Dutch), Target (British) and Seur (Spanish) to allow them to provide an integrated road network across Europe (Carbone and Stone, 2005). This partnership has grown and now includes seventeen different companies all covering different areas allowing the group to provide integrated road transport across Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Denmark, Germany, Hungary, the Netherlands, Moldova,

Montenegro, Poland, Portugal, Serbia, Slovakia, Slovenia, Spain, Switzerland, the UK and the Ukraine (NetExpress Europe 2012).

When looking at road freight companies, and other logistics providers' websites some companies make it very clear that they are interested in forming partnerships with other logistics companies and invite companies to contact them if they think they can form a suitable partnership. An example of this is West House Transport; this is a Welsh road freight company which is looking for partners who do not have existing infrastructure in South Wales which is its geographical area of expertise (West House Transport, 2007).

2.9.3 Sea Freight Providers

Evangelista and Morvillo (2000) carried out an analysis of the 341 formal horizontal collaboration partnerships that were undertaken by shippers operating in Italy between 1990-1998. This study drew a number of conclusions about collaboration in the Italian shipping industry. Firstly, 80% of all partnerships Italian shipping lines were involved in were with a foreign company, this was believed to be to enable them to gain access to technological and managerial expertises that they did not have in-house. Secondly, when the official agreements were analysed it was found that the agreements seemed to be predominantly orientated towards efficiency improvements rather than improving customer service or allowing them to offer a wider range of services. Thirdly, that in the period studied the number of horizontal collaborations with official agreements in place decreased. The authors believed this was due to the reduction in number of shipping lines generally.

McLellen (2007) took this point further and concluded that due to the reduction in the number of players in the sea freight liner market due to mergers and takeovers that the large companies left in the market are unwilling to collaborate even on non-strategic issues such as containerisation, which had affected all of them.

Argarwal and Ergun (2010) presented four reasons for shipping line collaboration.

- 1) The shipping line industry is capital intensive and it is very difficult for shipping lines to develop service differentiation, making cost incredibly important, which encourages companies to form collaborative partnerships.
- 2) Larger ships provide economies of scale but are difficult for one company to fill. To combat this problem, companies collaborate to ensure they will have enough freight on a specific route to be able to achieve these economies of scale.
- 3) The market requires regular services, especially with the rise of JIT, which leads to smaller more frequent loads. Shipping lines need to provide regular services to fulfil the needs of their customers and horizontal collaboration can often be the only way to ensure good fill rates.
- 4) Horizontal partnerships can help the companies increase their global reach, which is increasingly important with customers looking for one provider which can service all their needs.

An example of a collaboration between a number of major shipping lines is the collaboration that began in 2005 between MISC Berhad (MISC), Mitsui O.S.K. Lines (MOL), Nippon Yusen Kaisha (NYK), Orient Overseas Container Line (OOCL) and Pacific International Lines (PIL) This collaboration saw the companies operate a two-loop weekly service from Port Klang and Singapore to New Zealand in which the carriers each operate certain days services and allow the other companies to book space on these vessels (NYK, 2005). OOL reported a 6% increase in its freight on this route along with a 4% increase in revenue per TEU in 2006 compared to 2005 (OOCL, 2006), which it attributed to this collaboration.

2.9.4 3rd Party Logistics Service Providers

Carbone and Stone's (2005) study into practices in the European logistics industry showed a significant frequency of horizontal alliances being formed between 3PL's. They identified three main reasons for the formations of horizontal partnerships by European 3PLs. Firstly, support for their European networks, due to the high costs of additional infrastructure many 3PLs are choosing to form partnerships to increase the number of options they can provide to their existing customer base. Secondly, 3PLs are forming partnerships to allow them to develop new competencies to help them move from 3PL's to 4PLs, which is a growing trend in the industry.

The reasons customers are choosing to work with 4PLs include their ability to offer global solutions (Win, 2008), their ability to offer a range of value-added services (Skjoett-Larsen, 2000), the fact that they can offer total singular accountability meaning customers only have to contact one company to gain information on their shipments, due to the fact that the 4PL develops partnerships and manages all the companies in the chain (Van Hoek and Chong, 2001). These all allow for greater efficiency in the supply chain and therefore 4PL's can offer the customer cost savings and more flexible services (Bourlakis and Bourlakis 2005), .

An alternate view on this is presented by Jharkharia and Shankar (2007) who argued that the rise in number of 4PL's is actually being caused by horizontal collaboration in the industry, which is forcing companies to try and compete through offering a wider range of services. Independent of whether the increase in 4PLs are causing horizontal collaboration or horizontal collaboration is causing a rise of 4PLs, customers are now aiming to create long term partnerships with a single company to provide all their logistics needs .

The last reason 3PLs are forming horizontal partnerships, that was identified by Carbone and Stone, was to allow them to enter new geographical markets. European 3PLs are

collaborating with foreign companies to allow them to successfully penetrate new markets with the help of local knowledge from the partner company.

An example of a European 3PL collaborating abroad to access new markets is Geodis which began a collaboration in 2004 with the Chinese 3PL DTW, to allow them to provide services to Dong Feng Peugeot Citroen. In 2008 Geodis bought out DTW's stake in the joint venture to allow them to become a key player, in their own rights, in the supplying of automotive parts from China to Europe (Anon, 2008a).

Joint ventures between 3PLs are not unusual with other examples including the TNT Lojistik collaboration between TPG, a Dutch 3PL, and Koc, a Turkish 3PL. This was founded in 2000 and aimed to provide integrated logistics services to Turkey and the surrounding region (Rushton and Walker, 2007). Koc brought its local knowledge and infrastructure to the partnership whilst TPG provided its knowledge of operating a global logistics network and a gateway for shipments to leave Turkey and be fed into a global network allowing them to be delivered round the world efficiently (Post NL, 2000). In 2004, TPG bought out Koc's share in the joint venture. Given the number of examples where the larger foreign partner has gone on to buy out the joint venture it started with a smaller local company or in some cases has bought its partner company out completely, it is possible that companies may become more wary of these types of partnerships.

An additional example is that of DB Schenker and Seino which founded Seino Schenker in 2002 to link Seino's domestic network with DB Schenker's international network (Schenker-Seino, 2012). Unlike the previous two examples, this joint venture still exists today.

In addition to joint venture partnerships, other horizontal partnerships have been entered into by 3PL's. Wincanton and Cerco developed a shared services partnership to allow them to

provide secure logistics to UK prisons. This combines Wincanton's planning and scheduling systems and training programmes with Cerco's secure vehicles (Wincanton, 2012).

An additional example of a horizontal collaboration partnership between 3PL's is the recently announced partnership between Hellmann UK and H Esser for road transportation between Belgium and the UK. This partnership will involve a shared shuttle service which will operate every 48 hours (Logistics Business Review (LBR) Staff Writer, 2012). It is perhaps interesting to note that whilst trade journals such as the LBR have treated this as a new partnership, the article which mentions the partnership on H Essers' site mentions a partner change rather than a new partnership (H Essers Unknown).

The United States Postal Service (USPS) is currently recruiting partners for collaboration in the form of consolidation of freight to allow it to fully utilise capacity in its fleet (USPS, 2011). USPS is inviting any freight carriers to apply to become a partner in this collaboration. This project will allow USPS to reduce costs associated with empty running whilst still maintaining current levels of service.

Possibly the most common form of logistics collaboration in the UK are the pallet networks. Many UK logistics companies advertise on their websites that they are part of a pallet network. This type of collaboration requires no integration between companies in the network except for communication between the individual company and the pallet network coordinator (Mason et al., 2007), this lack of contact between the companies makes collaborating easier as many of the necessary factors for collaboration discussed earlier in this chapter are not needed if there is no interface between the companies.

2.9.5 Freight Forwarders

Freight forwarders have come under increased competitive pressure from 3PLs due to their ability to provide door-to-door services. The idea that 3PLs are using horizontal collaboration

to compete with larger 4PLs offering a wider range of services is seen in a slightly different form here. Zhang et al. (2007) determined that horizontal collaboration is an effective way for freight forwarders to compete with the 3PL's. They found that by collaborating with companies such as air cargo providers they can improve the interfaces across the transportation modes in the logistics process and provide a service that is competitive to the service offered by 3PL's.

Krajewska and Kopfer (2006) stated that globalisation and the opening of markets is making it more difficult for the small and medium companies to compete against the large global players. They proposed that freight forwarders form horizontal partnerships to extend their resource portfolio and to reinforce their market position allowing them to compete with the larger companies more effectively. It could be suggested that generally any logistics company can use horizontal collaboration to broaden its services and therefore compete with larger players with more diverse range of services. In 2003 six of the top ten freight forwarding organisations were actually composed of networks of SMEs (Klaus, 2003 cited in Berger and Bierwirth, (2003)).

Examples of freight forwarder collaboration include the partnership between the American freight forwarders EGL and Emery. This partnership was developed due to both companies experiencing falling volumes in air freight in 2001 (Datamonitor, 2001).

Another circumstance in which freight forwarders may choose to collaborate is when faced with a special project. For example in 2010, Finnish Professional Cargo Care, Ocean Knight Shipping (China) and Russian International collaborated to allow for the air transportation of a 34 metric tonne metallic roll and associated equipment from Finland to Shanghai (Breakbulk Staff, 2010). None of the companies could have undertaken this project individually and all brought different resources and competencies to the collaboration.

2.9.6 Logistics function collaboration between competing manufacturers and retailer

Previously in this literature review it was mentioned that some authors such as Bengtsson and Kock (2000) discovered that horizontal collaboration is most effective when companies collaborate in terms of activities which are not their core competencies. It is perhaps for this reason that there are so many examples of manufacturers and retailers who undertake some form of logistics collaboration. Hoffmann and Schlosser (2001) found that 74.3% of the Austrian SMEs they surveyed were undertaking collaboration in the sales and logistics field.

A complementary explanation would be that companies are more likely to be willing to publicise collaborations that do not involve their core competencies, when they may want to keep collaboration in terms of core competencies less well known as it may undermine customer confidence or lead to customers approaching the partner company. This section will present a number of prominent examples of logistics collaboration between manufacturers and retailers.

The Institute of Grocery Distribution (IGR), a non profit organisation set up in 1909 has been helping its members to identify where they could potentially collaborate to save empty running miles and transport costs. This organisation includes major supermarkets and the major suppliers to supermarkets including both suppliers of food and non-food goods (Anon, 2008b). At the end of 2008 the IGR announced that the Efficient Consumer Project (ECR, UK) which was the specific project they were running to encourage logistics sharing 'had through measures such as sharing vehicles and more efficient warehousing the project has surpassed its targeted saving of 48 million miles. The 53 million road miles saved is equivalent to removing 900 lorries from Britain's roads or conserving 26 million litres of diesel fuel per year' (Griffin, 2008).

Some companies in the IGR had already begun collaborating prior to this initiative. Cooke (2011) described how Kellogg and Kimberly-Clark set up a shared service for deliveries to small customers in London and South-Eastern England in 2006. This involved Kellogg shipping products to the Kimberly-Clark distribution centre in Northfleet where the products are consolidated and mixed with Kimberly-Clark's products to allow for delivery by small trucks. This project has now been expanded and reciprocated with Kimberly-Clark products being shipped to the Kellogg distribution centre in Manchester allowing for full truckload deliveries to small retailers in the north-west. 2012 saw the expansion of this project with Tetley tea joining (Anon, 2012). This has also benefitted Norbert Dentressangle, as Tetley's have switched logistics providers to Norbert Dentressangle, because they are Kellogg and Kimberly-Clark's logistics provider and have been a key player in the facilitation of this project.

Norbert Dentressangle has also been involved in the facilitation of a collaboration between Continental and Dunlop Goodyear which sees the two companies sharing warehousing facilities (Anon, 2009a). The HSS (Handling and Storage Solutions) article this information was taken from quotes Mike Rice, the Business Development director of Norbert Dentressangle as saying that 'if competing end-users are willing to share distribution networks, 3PLs have to collaborate too, says'.

This suggests that when companies are looking for logistics providers in the future they may take into account the companies' horizontal collaboration history. For instance they may consider whether the company has itself been involved in horizontal collaboration partnerships or whether it has facilitated partnerships between its customers. A proven track record of horizontal collaboration may suggest that the logistics company will be willing and able to potentially identify partners for the customer to allow for an improvement in the customers' logistics efficiency and the lowering of the customer's logistics costs.

There are a substantial number of manufacturing companies which collaborate with competitors in terms of in-house logistics provision. Examples of this include United Biscuits and Nestle who collaborate in terms of shared delivery between their facilities in the Midlands and the North of England. Prior to the collaboration around one third of Nestle's lorries returning from the distribution centre in the Midlands were running completely empty (Gattoma, 2009). This partnership has allowed them to save 100 million km of road miles over a four year period (Anon, 2011).

Many of the retailers and manufacturers which start logistics collaborations go on to get involved in further collaborations, for example, as well as the collaboration with United Biscuits, Nestle also collaborate with Mars, this collaboration involves the delivery of Christmas confectionary to Tesco's, allowing for one vehicle to service both distribution centres rather than sending individual vehicles carrying only a partial load (Anon, 2009b). Kimberly Clark is also involved in logistics collaborations with Unilever in the Netherlands and Colgate and Rickett Benckiser in France (Graham, 2011).

An additional example was documented by Bengtsson and Kock (2000), in this case members of the Swedish Brewer's association collaborate on the return transportation of empty bottles back to the breweries. The companies will not co-operate on the outbound journey as they feel they need to retain the personal touch with their customers, but do not believe this personal touch is needed in the return supply chain.

In a white paper on logistics collaboration Lynch (2000) illustrated the cost savings of logistics collaborations through a number of examples including an \$800,000 a year saving made by General Mills by collaborating with an unnamed competitor on a single transport route and that of Nabisco, where company executives were predicting that they would see a decrease of 10% in their logistics costs due to collaborative logistics partnerships.

2.10 Research Gaps

Since horizontal collaboration has received less attention in the literature than other supply chain topics such as vertical collaboration, in the papers that have been written there have been some suggestions for where the research agenda for horizontal collaboration should be focused. This section will explore some of these suggestions.

Wilhelm's (2011) critique of existing literature on the subject of co-opetition and horizontal collaboration implied that the terminology horizontal collaboration and co-opetition are not clearly defined and that research should focus on fully establishing the meanings of these terms.

Crujssen et al. (2007a) criticisms of the existing literature included the fact that the literature lacks a general conceptual classification of types of horizontal collaboration and that research is lacking on exactly what forms of horizontal collaboration are applicable to which sectors of the logistics industry. It has been seen in this literature review that there are isolated bodies of research on the different forms of collaboration but very little research on classifying and contrasting them.

Crujssen et al. (2007a) is not the only paper to suggest this topic needs more research. Zhang et al. (2008) also felt that further research needs to be carried out to establish which types of horizontal collaboration are appropriate in different circumstances. Whilst, Wu and Choi (2005) suggested horizontal supplier relationships should be investigated to see how the product/service they are supplying affects these relationships.

Researchers have advised that more research is needed into exactly how horizontal collaboration partnerships should be set up. With Schmoltzi and Wallenburg (2012) encouraging researchers to study how individual companies approach collaboration in terms of establishing relationships and designing partnerships. In addition, Steinicke et al. (2012)

encouraged the use holistic research into governance modes for horizontal collaboration and how these governance modes affect the performance of a collaboration.

Studies on horizontal collaboration have tended to treat it as a completely separate strategic tool rather than considering how horizontal collaboration affects the firm holistically. Zhang et al. (2007) proposed that systematic empirical investigations into how companies have performed prior to the start of a horizontal partnership, during the collaborative stage and after the partnership has ended, need to be carried out, to help fully understand the benefits and problems associated with horizontal collaboration.

Hernandez-Espallardo (2006) wrote that the topics for further research should include how customers view the company whose services/products they are buying in terms of that company's involvement in horizontal collaboration. Do customers see their supplier being involved in horizontal collaboration as an advantage? As perhaps a way of keeping costs low for their customers? Or do they view it with distrust, thinking it has the potential for suppliers to work together to increase their bargaining power and increase prices?

Walley (2007) created an 8 point research agenda for co-opetition, which includes many of the issues that have also been noted in horizontal collaboration papers. The points in Walley's (2007) agenda were as follows.

- 1) Typologies and models of co-opetition
- 2) Co-opetition and firm performance
- 3) Co-opetition within an economy
- 4) Resources, capabilities, and competencies underpinning co-opetition
- 5) Application of co-opetitive strategy
- 6) Managerial perceptions of co-opetition
- 7) Internal co-opetition

8) Co-opetition and consumers

2.11 Chapter Summary

This literature review has reviewed the relevant literature on horizontal collaboration concentrating particularly on literature relating to horizontal collaboration in the logistics industry. As a result of this, the following important points have been identified.

- Horizontal collaboration in this study will be defined as the collaboration between competitors or potential competitors.
- Horizontal collaboration can be used to reduce costs, enhance efficiency and flexibility, improve customer service and allow companies to enter new markets.
- Whilst significant benefits have been seen from horizontal collaboration partnerships, these are in most cases difficult to implement with many factors affecting their success.
- Horizontal collaboration can be undertaken in a number of different forms which require different relationships and competencies to be developed. They also differ in whether partners need complementary or similar resource and skill sets and provide differing benefits.
- There is no definitive classification set which details the different types of horizontal collaboration.
- There has been no attempt made to contrast the benefits of different types of horizontal collaboration.
- It has been seen that horizontal collaboration is being undertaken by logistics companies that operate in the majority of the different sectors of the industry but no study has considered which types of horizontal collaboration are best for which industry subsectors.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter focuses on the research design and the approach for the analysis of empirical data. This chapter explains and justifies the different methods used to conduct the research study.

3.2 Review of Research Approaches

Matthews and Ross (2010) classified research questions into four categories. Firstly, exploratory defined as an initial attempt to understand or explore a phenomenon when there is little prior knowledge or understanding of the issues. Secondly, descriptive, these questions usually follow on from the exploratory questions and are concerned with quantifying and describing a phenomenon, for example how often does it occur? Thirdly, explanatory research questions consider the causes and effects of the phenomenon. Finally, evaluative research attempts to qualify the value of a practice and often includes making recommendations about how something can be changed or improved.

Different text books on research methods present slightly different arrays of research approaches. Wellington and Sczerbinski (2007) presented a diagram of the main approaches which is seen in Figure 3.1.

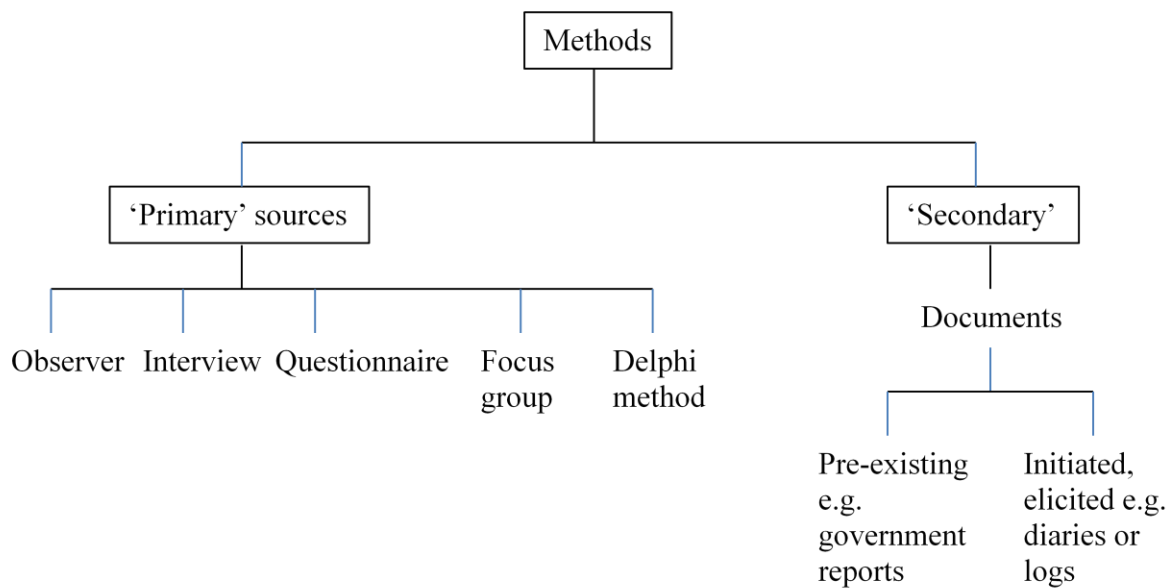


Figure 3.1 Research approaches (Wellington and Sczerbinski)

Whilst Wellington and Sczerbinski's classification is based on primary and secondary data many authors divide research methods into primary, secondary and mixed methods data collection. However, this classification does tend to produce some overlap with some research methods able to sit in multiple categories depending on the exact methodology used.

Matthews and Ross (2010) describe four main approaches, experiments, cross sectional studies, longitudinal studies and case studies. May (2010) considers the main approaches to be use of secondary statistics, surveys, conducting interviews, participant observation, documentary research, case studies and comparative research.

Considering the primary research methods, this section will review those more commonly used in the social sciences which are action research, case studies, Delphi method, focus groups, interviews and questionnaires. This section will also review the use of secondary sources.

3.2.1 Action Research

Through a literature review of action research in Operations management, Coughlan and Coughlan (2002) identified four key points that define action research. Firstly, action research is research in action rather than research about action, which works through a cyclical process of planning, taking action, evaluating the action, leading to further planning. Secondly, it involves the participation from people within the studied group/business/system in this cyclical process. Thirdly, the goal of the research is to make the actions undertaken more effective whilst building up knowledge. Fourthly, in addition to being a sequence of events, action research is also a problem solving methodology. Action research is considered to be most applicable in situations where the researcher is attempting to build theories around a particular set of ideas or phenomenon and testing out existing theories (Wood-Harper 1985).

Eden and Huxham (1996) in an article on action research for general management research developed a more complex definition of action research consisting of twelve contentions that they believe justify an action research project, these are shown in Table 3.1.

1	It should be possible to generate results, through the action research project, that can be generalised to provide information for other situations.
2	The research design should link explicitly with existing theory.
3	The generated results should link explicitly with the existing theory used to build the research design.
4	Action research should generate emergent theory.
5	Theory building, as a result of action research, should be undertaken in small incremental steps, moving from the particular case to the general implications.
6	The research design should make the people involved in the research aware of what they will get out of it.
7	A high degree of method and orderliness is required in reflecting about, and holding on to, the emerging research content of each episode of involvement in the organization.
8	For action research, the process of exploration (rather than collection) of the data, in the detecting of emergent theories, must be either, replicable, or demonstrable through argument or analysis.

- 9 Adhering to the eight contentions above is a necessary but not sufficient condition for the validity of action research.
 - 10 The researcher should be able to justify the use of action research in terms of the use of action research methodology providing useful data that would not be generated through other research methods.
 - 11 Any opportunities for triangulation of results should be exploited.
 - 12 The reasons for the intervention and context for the intervention must be key considerations for the interpretations of the results.
-

Table 3.1: The 12 contentions (Eden and Huxham, 1996)

Advantages of action research include that through working closely with managers action research can provide a depth of understanding denied to more objective methods (Westbrook 1995). This methodology provides clear direct improvements and knowledge gains for the company being studied as well as the knowledge gain to the researcher (Hult and Lenning, 2007). If the company can see a direct gain, they are more likely to be willing to participate in this type of research than other research methods such as case studies which may not provide improvements and knowledge gains for the company.

Dickens and Watkins (1999) considered the main critiques of action research to be the general conflict between action and research which often leads the project to be severely biased towards action or research, action research can lack the rigor of true scientific research and the lack of external and internal control of the project due to the high level of control of the company the project is taking place in. A further disadvantage of action research include the lack of objectivity due to the researcher being part of that which is researched; it is considered less valuable for hypothesis testing than other methods (Westbrook 1995).

3.2.2 Case studies

The most commonly cited definition of case studies is that of Yin (1984), ‘a case study is an empirical inquiry that investigates a contemporary phenomenon within a real-life context where the boundaries between phenomenon and context are not clearly evident and in which multiple sources of evidence are used’. There are a number of different classifications of case studies; these are described in Table 3.2.

Case study Type	Definition
Explanatory	This type of case study can be used to explain causal links in situations that are too complex for survey or experimental procedures to work.
Exploratory	Used to explore and explain a phenomenon, when it is being studied in a wider context.
Multiple /collective case studies	Used to explore differences and similarities between the implementation of occurrence of a particular phenomenon to find commonalities between cases.
Intrinsic	This is where the researcher picks to study the phenomenon in a particular situation/organisation because it appears to be a standard case/implementation of the phenomenon.
Instrumental	This is where cases are used to provide insight into an issue or refine a theory rather than providing understanding of a particular situation.

Table 3.2: Case study designs (adapted from Baxter and Jack 2008)

Benbasat et al. (1987) identified three important strengths of the case study approach. Firstly the phenomenon can be studied in its natural setting and meaningful and relevant theory can be generated from the understanding gained through observing actual practice. Secondly, the case method allows the much more meaningful question of *why*, rather than just *what* and *how*, to be answered with a relatively full understanding of the nature and complexity of the complete phenomenon; and thirdly the case method lends itself to early, exploratory

investigations where the variables are still unknown and the phenomenon not at all understood.

3.2.3 Delphi Method

The Delphi method is primarily used for forecasting and to aid decision-making based on expert opinions (Landeta 2006), making it most suitable for investigation type research questions that sit in the fourth level of Matthews and Ross’s classification, evaluative research. Table 3.3 illustrates the standard Delphi process.

DELPHI FORECASTING STEPS	
Step	Activity
1	Define the problem
2	Select willing and knowledgeable participants
3	Structure the initial questionnaire
4	Select the medium
5	Questionnaire 1: Initial input
6	Combine and re-fine the initial predictions
7	Questionnaire 2: Likelihood ratings
8	Compute the average and the range
9	Questionnaire 3: Reconsideration
10	Re-compute the average and range
11	Further analysis

Table 3.3 Delphi forecasting steps (Ogden et al., 2005)

Delphi studies are not all carried out using the exact same methodology, with some studies undertaking a first round questionnaire to develop the initial predictions, whilst other researchers have undertaken this stage through conference sessions where predictions are discussed. The ratings or rankings asked in questionnaire can differ with researchers asking for ratings for likelihood, impact, desirability and in some cases the respondent’s confidence in their own predictions.

Once the first round responses have been collated, the standard method is to send out averages and ranges for each scenario and ask respondents to re-consider or explain any of their ratings that do not fall within a certain range of the mean. These re-considered values are then used for the final analysis.

Delphi studies specifically looking at aspects in the logistics industry have included ‘Scenarios for the logistics services industry: A Delphi-based analysis for 2025’ (von der Gracht and Darkow 2010). This investigated the factors that experts believed would shape the logistics industry over the next fifteen years. This was carried out through a brainstorming workshop at a Logistics conference, followed by two rounds which considered the desirability, impact and expectation probability of thirty eight projections.

A more specific Delphi study was published by Linz in 2012 on the subject of ‘Scenarios for the aviation industry: A Delphi-based analysis for 2025’. This focused on the factors likely to impact on the aviation industry including the air cargo industry, between now and 2025. As with the previously mentioned study this was carried out through brainstorming workshops and then two round which considered forty propositions which were evaluated in terms of probability and impact.

Landeta (2006) concluded that the number of social science academic journal papers published on the subject of or providing results from a Delphi study had stayed roughly constant over the last thirty years, moreover, an increase in the number of Delphi based papers has been seen over the five years prior to the articles publication.

3.2.4 Focus Groups

Focus groups were initially used as a method of gathering information for market research and perceptions on products (Wilkinson 2004). A focus group is defined as ‘a group interview where a number of individuals focus on a particular task, topic or stimulus’

(Robson 2002). They are interactive discussion groups that can be used for generating knowledge and hypotheses, exploring opinions, attitudes, and attributes, evaluating commercials, and identifying and pretesting questionnaire items (Fern 1982). It is a qualitative technique most suited to why and how questions and thus answering explanatory and evaluative research objectives.

Focus groups are considered to be a useful tool for eliciting people's reactions to a product or idea and to allow the researcher to observe at some level how this changes with group interaction (Nielson 1997). Stewart and Shamdasani (1990) conveyed a number of reasons focus groups can be more beneficial than individual interview, questionnaires or Delphi studies, due to the interaction between participants. They classify these advantages into two categories, the advantages from the participant's point of view which include synergy, snowballing (bandwagon effect), stimulation, security, and spontaneity. The advantages they put forward for the researcher include, they offer serendipity, collective wisdom, specialisation, scientific scrutiny, structure, and speed. A larger number of participants views can be gained in a shorter amount of time than if the researcher was interviewing participants individually. Interviewing participants in a group can also allow them to come up with new joint ideas and make it easier for the researcher to present a 'best' solution or common idea at the end of the research.

The undertaking of focus groups has attracted a number of criticisms. Parent et al., (2000) notes that as a research method, focus groups can be criticized for the subjectivity of their technique, the inconsistency of results across groups and moderation idiosyncrasies. As focus groups are facilitated by the researcher, it is possible for the researcher to bias the participant's answers; with participants giving the answers they believe the researcher wants to hear (Morgan 1997). Nielson (1997) suggests that whilst focus groups can be a useful

source of information, the information gained from focus groups should always be used in tandem with results from other types of research.

3.2.5 Interviews

The definition for interviews when used as a research technique is an ‘in-depth, semi-structured form of interviewing or a conversation with purpose’ (Mason 1996). Interviews can be used to gain insight into individuals’ knowledge, views and experiences and are therefore most appropriate for exploratory or descriptive research.

Rabionet (2011) proposed six fundamental steps in undertaking an interview based research methodology. These were as follows.

- 1) Select the type of interview
- 2) Establish ethical guidelines
- 3) Define the interview protocol
- 4) Conduct and recording of the interview
- 5) Analyse and summarise the interview transcripts
- 6) Report the findings

Interviews can be undertaken in two main ways, face-to-face or by telephone. Sturges and Hanrahan (2004) proposed that four main issues should be taken into account when deciding whether face-to-face or telephone interviews are most appropriate. The first of these is the sensitivity of the topic, respondents often feel greater anonymity when talking to a researcher by phone, increasing the level of information they are willing to give. However, emotional sensitive topics have been shown to illicit better responses from face-to-face interviews. Secondly, whether the respondent group will be easier to reach by phone calls or in person and thirdly, interviewer safety. The fourth factor that should be considered is cost, if the

respondents are widely spread in geographic terms, telephone interviews will be more cost effective.

3.2.6 Questionnaires

One of the main advantages of undertaking survey research over other forms of research methods is its ‘ability to inexpensively reach large geographically dispersed groups’ (Synodinos, 2002).

Filippini (1997) identified three types of aims that can be met through survey research. Firstly, investigation, questionnaires can be used to determine how new concepts are related and can help discover new details about the concepts. Secondly, confirmatory, questionnaires can be used to test hypotheses and to confirm relationships between variables. Thirdly, descriptive, questionnaires can be used to obtain descriptions and distribution of events. Filippini (1997) considered most surveys in operations research to be descriptive.

Questionnaires can be administered in a number of ways, as illustrated by Figure 3.2.

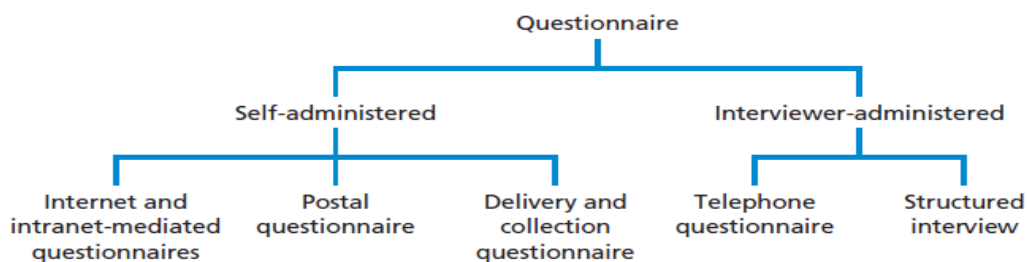


Figure 3.2: Types of questionnaire (Saunders et al., 2003)

Figure 3.2 starts by classifying questionnaires as to the administration method used. In this research a self administered questionnaire was undertaken as the research needed responses from a large population that were geographically dispersed making face-to face interviews difficult to undertake. Self-administered was chosen over interviewer-administered to encourage the maximum responses as one of the major advantages of self-administered

questionnaires is the convenience for the respondent, with it being possible for the respondents to complete the questionnaire at the time most convenient to them (Klassen and Jacobs, 2001). Whilst it is possible to arrange interviews in advance for a time the respondent thinks will be convenient there is no guarantee it will be convenient at the time.

Dillman (1991) concluded that mail surveys are used more frequently in social science research than either telephone or face-to-face interviews. There are a number of reasons for this behaviour including, the cost and convenience which have already been discussed; the other main reason is that it is easier for the respondent to stay anonymous. Particularly in cases where company information is requested, many respondents want assurances that their data will remain anonymous. Mail questionnaires can also be used to elicit a higher number of responses over a fixed period of time than could be achieved through an interviewer administered questionnaire due to the lower amount of administrator time needed.

3.2.7 Secondary Data Sources

Secondary sources are of particular interest in research which focuses on the later stages of research approaches. For studies undertaking exploratory research this can be very difficult as if research into this area is still in its infancy it is unlikely that there will be any volume of secondary sources available, although it might be possible to use data collected for other purposes.

Boslaugh (2007) describes three main advantages of using secondary data over primary data collection methods, these are as follows. Firstly, cost, even if the researcher has to pay for access to the secondary source, it is still likely to be cheaper than collecting the data, especially for large scale surveys. It is also extremely time efficient which will also reduce costs. Secondly, using secondary data can increase the geographical or other breadth of the study by allowing the researcher access to participants that they would not have access to in

primary research. Thirdly, secondary data sets will often have been collected and analysed by professionals in their field, allowing the junior researcher access to more robust data than the researcher them self may have collected.

Smith (2008) lists a number of issues with using secondary data, these include.

- 1) The difficulty of assessing the accuracy of the data, with any primary research there will be some limitations to the data, however, when using secondary sources the researcher using them may not be clear on the exact limitations leaving the research open to criticism.
- 2) Social data cannot easily be reduced to numbers and the secondary data available to the researcher may not take into account some of the factors or context that could be affecting the results and would have been seen if primary data collection had been undertaken.
- 3) Secondary sources of data may have a bias due to the body carrying out/sponsoring the project and this will bias any secondary research that the data is used for.

3.2.8 Mixed methods research

With all research methods containing some flaws many researchers use a mixed methods approach in an attempt to compensate for issues with each research method. Johnson et al. (2007) define mixed methods research as ‘an intellectual and practical synthesis based on qualitative and quantitative research; it is the third methodological or research paradigm (along with qualitative and quantitative research). It recognizes the importance of traditional quantitative and qualitative research but also offers a powerful third paradigm choice that often will provide the most informative, complete, balanced, and useful research results.’

Mangan et al. (2004), in a paper concerned with research methodology in logistics, criticised the dominance of quantitative research in logistics and proposed that mixed methods are a

good way to increase the qualitative research being done in logistics, thus opening up the research field to become more holistic. Carter et al. (2008) stated that the right paradigm for supply chain research is one that includes multiple complementary methods to allow for the different methods to compensate for the weaknesses in other methods

The standard definitions of mixed methods simply state that it is a mix of qualitative and quantitative research. Leech and Onwuegbuzie (2009) criticised this stating that it is a very wide definition and in an attempt to rectify this created a typology of the different types of mixed methods research, this is depicted in Figure 3.3.

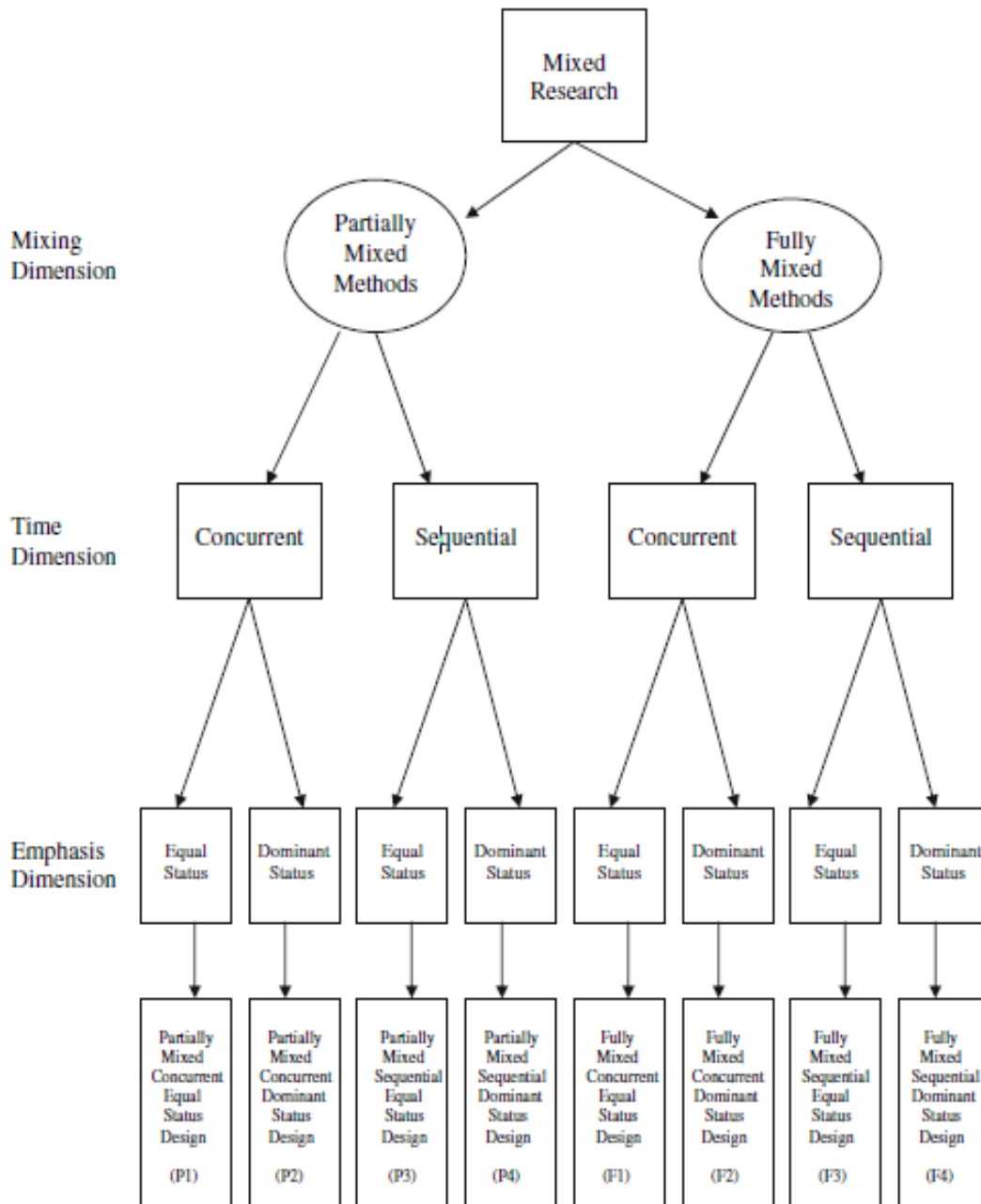


Figure 3.3: Typology of mixed research (Leech and Onwuegbuzie, 2009)

The typology suggests that the type of mixed method employed can be classified according to whether the qualitative and quantitative parts of the study are undertaken separately, whether they are undertaken concurrently or sequentially, and whether they have equal status.

3.3 Research Context and Justification of Research Approach

It was seen in the literature review that there is very little secondary information available on horizontal collaboration, so at this stage primary data collection was needed. Horizontal collaboration research in the logistics industry has thus far been confined to mainly exploratory research, with researchers investigated how and where horizontal collaboration is being undertaken, with some research also trying to address why horizontal collaboration is being undertaken.

Research methods for investigating horizontal collaboration in the logistics industry have been limited to questionnaires and case studies, although research into freight consolidation has widely relied on computer simulation. This is also true of research in horizontal collaboration in other industries. There is no evidence of the use of Delphi methods, focus groups and very little mention of action research. A number of studies have used interviews. In addition to this a number of horizontal collaboration papers have relied on mixed methods most commonly a combination of a survey and case studies.

In the wider field of operations management, a google scholar search on research methods papers written specifically for the operations management field provides papers which focus mainly on surveys, case studies and more recently action research and structural modelling.

The aims of this research are primarily explorative with the initial objective being to discover to what extent horizontal collaboration is being undertaken by companies in the logistics industry and how factors such as company size and type related to this. This research also aims to explore the drivers and barriers to horizontal collaboration and the characteristics of horizontal collaboration projects. This research is mainly exploratory although some attempt will be made to describe and explain the phenomenon of horizontal collaboration in the logistics industry.

The aim of the first part of the research was to gain a holistic high level view of how horizontal collaboration is being undertaken in the logistics industry. The review of the literature showed that academic interest in horizontal collaboration was growing, however, while examples of companies undertaking horizontal collaboration were found, there was very little indication of how common the practice is in the logistics industry. This stage of the research aimed to find out how common the practice of horizontal collaboration is in the logistics industry and whether this varies with factors such as company size and type.

Another important objective of this stage was to ascertain which types of horizontal collaboration are prevalent in the logistics industry. It was seen in the literature review that more academic research papers have been written on the subjects of joint procurement and joint ventures than other types of horizontal collaboration, but there had been no attempt in the literature to contrast the numbers of companies entering into these forms of collaboration. As with the previous objective, as well as understanding the degree to which the different types of collaboration were undertaken in the logistics industry, the purpose of this part of the research was to also to investigate any underlying pattern of implementation.

In addition to gaining an understanding of the level to which horizontal collaboration is being undertaken in the logistics industry, at this stage one of the important ambitions of the research was to identify the drivers and barriers to horizontal collaboration in the logistics industry.

Furthermore, in this stage of the research one of the primary objectives was to understand the basic characteristics of the horizontal collaboration partnerships being undertaken in the industry in terms of attributes such as number of partners involved in the collaboration, length of the collaboration and the benefit sharing model.

As the main aim of this stage of the research was to gain a broad overview of the practices in the logistics industry, a large number of companies' horizontal collaboration practices needed to be considered. For this reason a questionnaire was considered to be the most appropriate research method for obtaining this overview, as this would allow a number of exploratory questions to be asked of a large population to be sampled.

There were a number of advantages in this research setting to using a questionnaire. Firstly, questionnaires provide wide and inclusive coverage of the present situation (Denscombe 1999). Using a questionnaire allowed this research to develop a picture of how horizontal collaboration was being undertaken at the time of the research across the logistics industry. Secondly, the questions that this research aimed to answer were probing in terms of company information and respondents are more likely to be willing to give sensitive information on a questionnaire than in other forms of research as there is a perceived level of anonymity (Forza 2002). Thirdly, questionnaires are less time consuming for the researcher than other research methods such as interviews or focus groups, allowing a larger number of respondents to be considered (McGorry 2000), questionnaires can also be completed at a time convenient to the respondent (Kiesler and Sproull 1986).

A Delphi study also has the potential to reach a large number of geographically dispersed respondents, however, Delphi studies have been found to be most appropriate to studies considering the future of a particular phenomenon. As this research focused, primarily, on how horizontal collaboration is being undertaken at present, a Delphi method was deemed inappropriate to meet the research objectives.

The later objectives of this research were more descriptive and with these objectives being fundamentally different, there was no one research method that would have allowed all these objectives to have been met successfully.

At this stage the research considered exactly why a company had undertaken horizontal collaboration, how this was being done and exactly what affect this had on the everyday processes. At this stage information on the benefits companies were seeing from each type of collaboration was also collected.

The other main aim of this stage of the research was to continue the work on identifying differences between types of collaboration by the use of case studies where companies were involved in different types of collaboration.

As mentioned previously, a considerable percentage of horizontal collaboration research has been based on a mixed methods approach, mainly using surveys together with interviews or case studies. Voss et al. (2002) advocated the use of case studies as a follow up to questionnaire research to examine the phenomenon studied more deeply; this was the aim of using questionnaires and case studies in this research. Gable (1994) summarised the relative strengths of case study research and questionnaire research to illustrate the complementary nature of the two methods, as shown in Table 3.4.

	Case Study	Questionnaire
Controllability	Low	Medium
Deductibility	Low	Medium
Repeatability	Low	Medium
Generalisibility	Low	High
Discoverability (explorability)	High	Medium
Representability (potential model complexity)	High	Medium

Table 3.4: Relative strengths of case study and survey methods

It was decided to use cases in this research rather than interviews as this would allow more in-depth information to be gained for each instance of horizontal collaboration, allowing a deeper and more holistic understanding, of how individual companies undertake horizontal collaboration, to be gained. With horizontal collaboration literature still being in its infancy, it

was deemed important to gain as much information about each instance as possible to help fully understand horizontal collaboration practices. Case studies can be used for a number of different research purposes, as is illustrated by Table 3.5.

Purpose	Research question	Research structure
<i>Exploration</i>		
Uncover areas for research and theory development	Is there something interesting enough to justify research?	In depth case studies Unfocused, longitudinal field study
<i>Theory building</i>		
Identify/ describe key variables	What are the key variables?	Few focused case studies In-depth field studies
Identify linkages between these variables	What are the patterns or linkages between variables?	Multi-site case studies
Identify “why” these relationships exist	Why should these relationships exist?	Best-in-class case studies
<i>Theory testing</i>		
Test the theories developed in the previous stages	Are the theories we have generated able to survive the test of empirical data?	Experiment Quasi-experiment
Predict future outcomes	Did we get the behaviour that was predicted by the theory or did we observe another unanticipated behaviour?	Multiple case studies Large-scale sample of population
<i>Theory extension/refinement</i>		
To better structure the theories in light of the observed results	How generalisable in theory? Where does the theory apply?	Experiment Quasi-experiment Multiple case studies Large-scale sample of population

Table 3.5: Matching research purpose with methodology (Voss et al., 2002 adapted from Handfield and Melnyk, 1998)

In this research, the main aims were to identify linkage between variables, meaning the focus of this research was on theory building. This research was trying to distinguish the differences between different types of horizontal collaboration in terms of the way the different types are established, the way they affect the day to day running of a business and the advantages they bring to a business. Table 3.5 suggests that in the case of trying to identify linkages between variables, multiple case studies should be used. Eisenhardt (1991) concluded that multiple case studies are employed in management studies to develop theoretical insight through replication and extension.

3.4 The Research Methodology

As justified in the previous section this research methodology utilises a mixed methods approach which can be broken down into a series of steps as described below.

- 1) Selection of key aspects of horizontal collaboration including research question formulation, questionnaire development and the undertaking of a pilot study.
- 2) Identification of key aspects of horizontal collaboration, initial questionnaire and generate initial statistics.
- 3) Identification of effectiveness of horizontal collaboration consisting of the development and undertaking of the follow-up survey.
- 4) Evaluation of the effectiveness of horizontal collaboration, statistical analysis including Kruskal-wallis tests.
- 5) Identification of practices involved in horizontal collaboration, consisting of case selection and the undertaking of the case studies.
- 6) Analysis of practices involved in horizontal collaboration, this involved cross-case analysis to identify patterns and trends.

3.5 Application of the Methodology

This section will be split into three sections which reflect the three main methodological sections of the study, the initial questionnaire, the follow-up questionnaire and the case studies.

It should be noted that before the research was carried out ethical approval was obtained from the University for the Methodology described.

3.5.1 Initial questionnaire

This section will explain the administration of the initial questionnaire and the issues surrounding this.

3.5.1.1 Identification of population and sampling

The sample was collated by using the FAME database (Bureau van Dijk, 2009), through a search for all transportation companies. Companies that solely provided passenger transport were then deleted from the list. To increase the sample, searches were carried out on online logistics directories such as the FreeIndex Logistics Directory (FreeIndex Ltd, 2012). These provided a sample of 2100 companies.

The targeted respondents at each company were restricted to Operations Directors/Managers and Managing Directors in an attempt to gain an overall view of how horizontal collaboration was being undertaken at the respondent's company.

3.5.1.2 Content of the questionnaire

The questionnaire was designed so that the majority of the questions were closed ended as this type of question has been proved to provide more reliable data that is easier to analyse in the case of a large scale survey (Schuman, 1996). This was also done to minimise the time the questionnaire would take to complete as length of the questionnaire has been shown to

have negative effects on response rates particularly in terms of questionnaires sent to business respondents (Jobber and Saunders, (1993) and Tomaskovic-Devey et al., (1994)).

The questions in the initial survey were sub-divided into four categories. The first category of question simply aimed to classify the company in terms of size and sub-section of the logistics industry. The second section asked respondents to indicate from a broad selection what they believed to be the drivers and barriers to horizontal collaboration in the logistics industry. Respondents were encouraged to add their own drivers and barriers to the ones included in the response list. The third section concerned the level of adoption of collaboration, whether companies were already undertaking horizontal collaboration or whether they were researching or observing collaboration in the industry. This section also sought to discover exactly which resources companies were sharing in horizontal collaboration projects. The fourth section considered the features of horizontal collaborations. These were categorical questions that examined the number of partners companies were working with, the length of time companies had been involved in collaboration, the number of horizontal collaboration projects companies were involved in, the geographical location of partners, the typical length of collaborations and the relative size of partners. The full questionnaire can be found in appendix A.

3.5.1.3 Administration of the questionnaire

Having decided upon the relevant questions to be used and having established that a postal questionnaire would be most appropriate, a pilot survey was undertaken in March 2010. The paper questionnaire was sent out with a brief introduction letter explaining the purpose of the research and informing potential respondents that all respondents would receive a summary of the reports. In addition to this a stamped addressed envelope was provided for respondents to send the questionnaire back to the researcher. The pilot study was sent out to 100 companies and 11 responses were received.

A number of small changes were made to the questionnaire following the pilot study as it was made clear that some of the terminology that had been used was not understood by the respondents. The questionnaire was then sent out to the full sample between April and July 2010.

3.5.1.4 Analysis of the questionnaire data

Once the responses had been received, they were anonymised and inputted into an SPSS database. The initial survey response data was primarily in the form of ordinal and nominal data. For this reason, the majority of the analysis was undertaken through simple statistical techniques such as the calculations of the averages. The data was also analysed through cross tabulation allowing for the effects one variable had on another to be considered.

3.5.1.5 Validity of the data

To check the validity of the responses, t-tests were then carried out to check for non-response bias and to compare the initial responses to the later responses which was thought to be necessary due to the relatively long period of time over which the survey was carried out.

The test for non-response bias was conducted by comparing the size profile of the logistics subsection of the FAME database to the respondent size profile. This showed no significant difference between the sample and the respondents to the 95% confidence interval. The distribution of respondent companies in terms of size is shown in Figure 3.3.

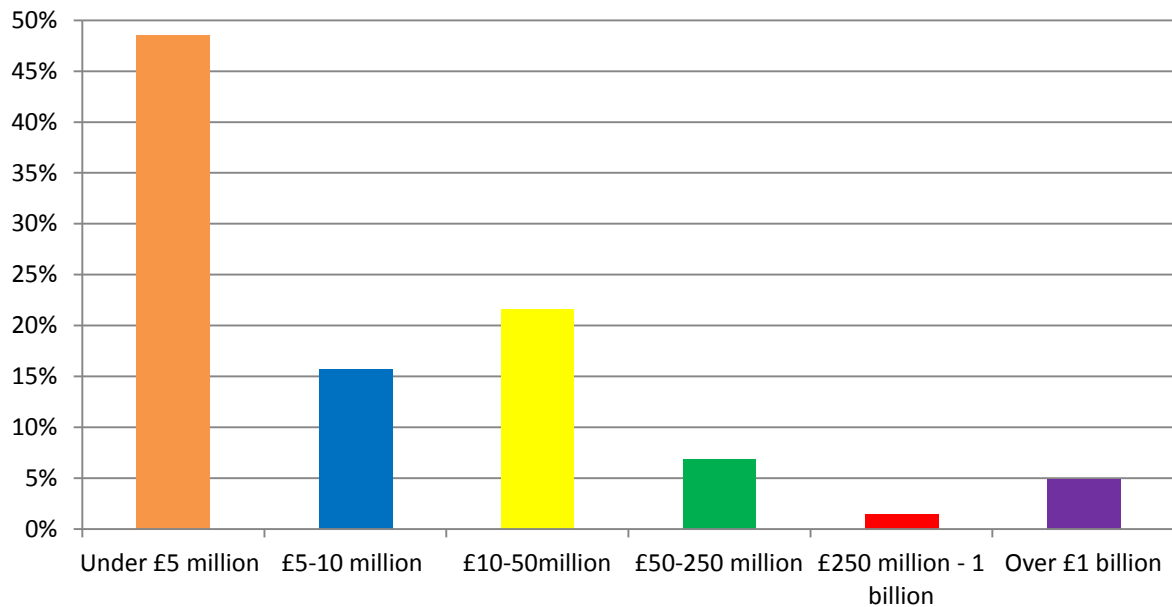


Figure 3.3: Respondent size profile

The evaluation of significant difference between the first 50 responses and the last 50 responses focused on the respondents' answer to the question: "To what degree is your company involved in horizontal collaboration?" This analysis showed no significant difference between the two sub-sections of responses to the 95% confidence level.

3.5.2 Follow-up questionnaire

This section will explain the administration of the follow-up questionnaire and the issues surrounding this.

3.5.2.1 Inclusion criteria

The follow up questionnaire was sent to all respondents who had indicated that they were collaborating with competitors, collaborating with potential competitors or conducting a pilot study into horizontal collaboration. This criterion was used to allow results to be gained on how effective the types of horizontal collaboration have been to a particular company rather than how effective respondents think they might be.

3.5.2.2 Content of the questionnaire

The follow-up survey was tailored to each respondent and asked the respondent to rate the effectiveness of the initiatives and types of resource sharing they were involved in using a five-point Likert scale. Likert scales are an appropriate and well established method in operations management used to measure attitudes, perceptions and feelings in an organisational setting (Hensley, 1999). The five point Likert scale used in this research was numbered from -1 to 3, with the labels -1=negative effect, 0=no effect, 1 weak positive effect, 2 moderate positive effect, 3 strong positive effect. This allowed respondents to rate the positive effects horizontal collaboration has had on their company whilst allowing for the possibility that some companies had seen negative impacts.

Additional open ended questions were used to clarify points from the original questionnaire in terms of length of time the company has been involved in horizontal collaboration, overall number of partners and number of partners involved in each type of collaboration. The latter of these was included as most companies had indicated they were involved in multiple types of collaboration making it difficult to establish the average number of partners companies were working with on each initiative. The first two questions were only asked if the respondent had indicated more than 6 partners or more than 5 years' involvement in collaboration. This was done to help give more exact averages for these two questions.

An additional question was added to all follow-up questionnaires and concerned how the respondents felt their company's involvement in horizontal collaboration would change over the next 5 years. An example of a typical follow up questionnaire is shown in Appendix B.

3.5.2.3 Analysis of the questionnaire data

A further t-test was carried out to ensure that the respondent profile for the follow-up survey was the same as that of the initial survey. This also showed no significant difference at the 95% confidence level.

For the likert scale questions in the follow-up survey, means were calculated and then Kolmogorov-Smirnov tests were performed on the data to assess the normality of the distribution of responses and thus establish whether ANOVA tests could be used. Due to the responses not being distributed normally, ANOVA tests could not be undertaken to evaluate the differences between mean scores for the groups. Schmider et al. (2010) stated that when data is skewed, it indicates it no longer reflects the central location and when variances are unequal, not every group has the same level of noise, and thus comparisons using ANOVA are invalid.

Kruskal-Wallis tests were undertaken to assess the difference in mean scores between groups. Kruskal-Wallis tests can be used on data that does not have a normal distribution (Conover and Iman, 1981), and can be used to compare the means of a number of groups (Sueyoshi and Aoki, 2001), allowing for calculations to be undertaken that compare for example, the mean effectiveness of all the types of collaboration or the effectiveness of one type of collaboration in companies of different sizes. In cases where significant differences were seen, these were followed up by Mann Whitney U tests to reduce type 1 errors, which occur when the null hypothesis is falsely rejected (Zimmermann 1994).

3.5.3 Case studies

This section will explain the administration of the case studies and the issues surrounding these.

3.5.3.1 Procedures and initial question sets

The case studies were undertaken through interviews with staff at the case study companies, the collating of data provided by the company and the collecting of secondary data. The standard case study protocol was as follows.

- 1) Identify a potential case study company from the responses to the questionnaires.
- 2) Contact the respondent by e-mail and/or phone to request a meeting.
- 3) Collate as much information about the company as possible.
- 4) Undertake the first interview with the respondent.
- 5) Analyse the data from the first interview with any further secondary information given by the respondent or found through internet and news searches.
- 6) Identify further questions and gaps in the information.
- 7) Arrange a second interview or e-mail the questions to the respondent.
- 8) Analyse the further questions.

In some cases steps six to eight were repeated, where more information was needed and the respondent was willing to answer further questions. In a number of cases a second person from the company provided information to answer the follow-up questions.

The initial interview questions were split into a number of categories.

- 1) General introductory questions, which sought to affirm the type of collaboration the company was undertaking and understand to exactly at what level the company was collaborating.
- 2) Implementation of the collaboration, which focused on exactly how the horizontal partnership had been started and developed.

- 3) General performance enhancements of the collaboration, this section looked at what the company had been aiming to improve by setting up a horizontal collaboration partnership and whether these benefits had been seen.
- 4) Cost benefits, this section and the subsequent three sections aimed to gain insight into, and quantify the exact benefits that could be attributed to the particular horizontal collaboration, how these came about and whether they were sustainable.
- 5) Efficiency benefits
- 6) Customer service benefits
- 7) Flexibility benefits
- 8) Future horizontal collaboration practices, this section focused on how companies perceived their horizontal collaboration practices would change and how they would like to use horizontal collaboration to improve their businesses going forward.

3.5.3.2 Selection of cases

The case studies were selected based on the types of horizontal collaboration the respondent had indicated the company was involved in. One of the aims of the case studies was to examine the differences between the ways different types of horizontal collaboration are undertaken. For this reason comparative case studies were undertaken.

Four lists were drawn up representing the respondents that had indicated they were involved in each of the types of collaboration. These lists were then arranged by geographical proximity as it was easier to visit local companies multiple times. Respondents were contacted individually by e-mail or mail asking if they were willing to be interviewed for the research and if no reply or a negative reply was received the next respondent on the list was contacted until two companies on each list had indicated their willingness to be involved in the study.

However, one joint venture case was undertaken with help from research contacts overseas, due to the small number of respondents indicating involvement in joint ventures and the reluctance of these to be interviewed.

Finding willing participants undertaking joint procurement, which was the least popular type of collaboration was also difficult and despite contacting every company that indicated they had been involved in this type of collaboration only one respondent was willing to participate in this stage of the research. Therefore, this stage of the research consists of seven case studies rather than eight which had been the target.

3.5.3.3 Analysis of Case Studies

Yin (2008) proposed two basic strategies of case study analysis: within-case analysis and cross-case analysis. Within-case analysis involves the exploration of individual cases, whilst cross-case analysis focuses on identifying the similarities and differences between cases.

Eisenhardt (1989) described one of the ways to undertake cross case study analysis as the process of selecting categories or dimensions, and then to look for within-group similarities coupled with intergroup differences. These can then be condensed into a table for easy comparison. This process was undertaken in this research with the different dimensions considered being as follows.

- Type of collaboration being undertaken, including exact resources shared
- Type of company and type, size and reasons for choosing particular partners
- Reasons for their involvement in this type of collaboration
- Degree of formality involved in the collaboration
- Direct cost-related performance enhancements
- Indirect cost-related performance enhancements
- Efficiency-related performance enhancements

- Customer service-related performance enhancements
- Flexibility related performance enhancements
- Future outlook for the collaboration

These dimensions provided a simple way to contrast the information obtained from the case studies, allowing for comparisons to be drawn between the ways different types of horizontal collaboration are being undertaken in the logistics industry and the different types of benefits that are being reaped through these different initiatives.

3.6 Summary

This chapter detailed and justified the steps taken in this research. This research takes a mixed methods approach involving a combination of two questionnaires and seven case studies. The aims of this approach was to gain a general picture of the state of horizontal collaboration implementation within the logistics industry through the questionnaire research and to then gather more in depth information on how the different types of horizontal collaboration are undertaken through a set of comparative case studies.

The results and statistical analysis for the three stages will be presented in chapters four, five and six respectively.

CHAPTER 4

RESULTS AND ANALYSIS OF THE INITIAL QUESTIONNAIRE

4.1 Chapter Introduction

The initial questionnaire was sent out between April and July 2010 and was sent to 2100 companies. Each company received a cover letter, a copy of the questionnaire and a free post envelope to return the questionnaire. This gave a response rate of 10.2%, with 205 useable responses being received. This chapter presents the results and analyses that were obtained from these responses.

4.2 Initial Bias Testing

Two sets of bias testing were carried out on the data collected from the initial questionnaire. These were both done in the form of t-tests and they considered non response bias and first and last respondent bias.

The non response bias test was undertaken to ensure that there was no significant difference between the respondents and the original sample, which would be caused by bias in the potential respondents choosing to answer the questionnaire or not. The factor that was considered in this test was the company size; the sizes of the companies that responded to the questionnaire were compared to the sizes of the full sample. This showed no significant difference between the sample and the respondents at the 95% confidence interval.

The first and last respondent bias test was undertaken to ensure there was no significant difference between the responses from the first respondents and the last respondents and was undertaken to ensure that the time lag between the first responses being received and the final responses being received had not significantly affected the results. This t-test was undertaken for one of the key questions of the questionnaire, this concerned the types of horizontal

collaboration that the respondent's company was involved in. This also showed no significant difference at the 95% confidence level.

4.3 Profile of Respondents

The profile of respondents was considered in four ways:

- 1) Type of company in which the respondent works;
- 2) Respondents position in the company;
- 3) Size of company in which the respondent works;
- 4) Whether the company is involved in horizontal collaboration.

As discussed in the literature review, respondents were asked to classify their company according to 5 categories. Table 4.1 shows the results of this classification.

Company Type	Percentage
3PL	27.8
4PL	3.4
Shipper	5.8
Freight Forwarder	31.9
Warehouse/Distribution Centre	17.3
Other	13.9

Table 4.1: Company classification

Table 4.1 shows that Freight Forwarding companies made up around one third of the respondents and 3rd Party Logistics providers around one quarter. Very few respondents classified themselves as 4th Party Logistics providers. It should be noted that not all respondents were able to classify their company as solely being in one category, 22.9% indicated that they believed their company fell into at least two of the categories. Other responses for this question included International Haulier, Haulage Contractor and Specialist Courier.

The questionnaire had been targeted at Managing Directors and Operations Directors in an attempt to ensure a high level view of horizontal collaboration was provided in the responses. However, Table 4.2 shows that there was some variation in the position of respondents.

Job Title	Percentage
Director	32.7
Managing Director	20.0
General Manager	9.3
Operations Manager/Director	7.8
Sales Manager/Director	3.9
Business Development Manager	3.4
Owner	2.9
Transport Manager/Director	2.9
CEO	1.9
Logistics Manager/Director	1.0
Other	9.8
Left blank	4.4

Table 4.2: Job titles of respondents

It can be seen that almost all of the respondents were in management positions, which enhances the value of the data. However, a number of respondents were working in sales management rather than in the operations and transport areas. These responses were included as it was thought that the questions were basic enough that the perception of a sales manager rather than an operations manager would not make a significant difference.

Around 10% of respondents gave an answer that did not fit into the categories in Table 4.2; these responses included Assistant to Executive Manager, Finance Director, Vessel Planner, Project Manager and Marketing Manager. A small percentage of responses were left blank, the majority of which were where the respondent had used a company stamp to give the name of the company and had therefore obscured the question on job title.

Company Revenue (£)	Percentage
Under 5 million	48.5
5 million – 10 million	15.7
11 million – 50 million	21.6
51 million – 250 million	6.8
251 million – 1 billion	1.4
Above 1 billion	4.9

Table 4.3: Company revenue

Table 4.3 shows the profile of companies by their annual revenue. The majority of respondents are from small and medium-sized enterprises (SMEs), with just under half of the companies having annual revenue of under £5 million. As was mentioned in the previous section a t-test was undertaken to check the respondents' size was representative of the sample.

With regard to involvement in horizontal collaboration, 79% of respondents indicated that they were undertaking horizontal collaboration. It is possible that this figure is slightly higher than the true percentage due to the fact that potential respondents that are actually undertaking horizontal collaboration were more likely to take an interest in the questionnaire and fill it out and return it than potential respondents not involved in collaboration. Only 12.7% indicated that they had no interest in horizontal collaboration at all. Table 4.3 illustrates the breakdown of these figures with regard to company size.

(Revenue in £s)	Under 5 million	5 million – 10 million	11 million – 50 million	51 million – 250 million	251 million – 1 billion	Above 1 billion
Collaborating with direct competitors	61.6%	66.7%	67.4%	64.3%	66.7%	70.0%
Collaborating with potential competitors	58.6%	54.5%	52.2%	57.1%	66.7%	80.0%
Pilot stage of a horizontal collaboration project	8.1%	12.1%	10.9%	0%	0%	30%
Looking for collaborators	30.3%	39.4%	28.3%	28.6%	0%	30.0%
Researching horizontal collaboration	8.1%	3.0%	10.9%	0%	33.3%	20.0%
Observing horizontal collaboration in the industry	7.1%	6.1%	10.9%	0.0%	33.3%	20.0%
No interest in horizontal collaboration	12.1%	15.2%	13.0%	14.3%	0%	10.0%

Table 4.4: Involvement in horizontal collaboration by company size

It can be seen from Table 4.4 that the smallest companies had the least involvement in collaborating with direct competitors, with the largest companies being the most likely to be involved in horizontal collaboration. This supports statements made in the literature about the fact that whilst SMEs might have the most to gain from horizontal collaboration they are least likely to be in a position to implement horizontal collaboration.

Table 4.4 also shows a higher percentage of companies are collaborating with direct competitors than with potential competitors, with this percentage generally increasing with size of the company.

Considering the ‘no interest in horizontal collaboration’ statement, the largest companies were least likely to agree with this whilst among SMEs there was a fairly similar percentage of companies who had no interest in collaboration.

Of the companies that indicated that they were looking for partners only 3% were not already involved in collaborating with direct or potential competitors. Of the companies researching horizontal collaboration 11% were not already involved in collaboration with direct or potential competitors and of the companies observing horizontal collaboration this figure was 17.6%.

4.4 Drivers to Horizontal Collaboration

Respondents were asked which of a number of statements they felt was a driver to horizontal collaboration and were invited to add any important drivers of horizontal collaboration that they felt had been omitted. The most popular responses to this question were ‘reducing transport costs’ with 73% of respondents agreeing with this statement, ‘enhancing customer service’ with 62% of respondents selecting this response and ‘access new markets’ which was selected by 59% of respondents. The remaining drivers were all selected by less than half of the respondents. The least popular responses was ‘lowering carbon emissions’ which was only selected by 20% of respondents.

Other responses to this question included allowing small to medium-sized companies to compete against large companies, offer a broader spectrum of services over a greater geographic area, establish public relations, understand the industry dynamics and identify new business opportunities, increase service range (both in terms of geographical range and

types of services) and provide solutions fit for purpose to the customer. The most popular of these other responses were the increase in service range which was mentioned in terms of both geographical range and type of services and allowing SMEs to compete against larger companies. Table 4.5 illustrates the break down of these results by company size.

Revenue in (£s)	Under 5 million	5 million – 10 million	11 million – 50 million	51 million – 250 million	251 million – 1 billion	Above 1 billion
Access new markets	58.9%	69.0%	60.5%	38.5%	0%	66.7%
Reduce transport costs	70.0%	75.9%	79.1%	46.2%	100%	77.8%
Reduce procurement costs	27.8%	27.6%	27.9%	7.7%	33.3%	13.3%
Enhance customer service	53.3%	72.4%	67.4%	69.2%	66.7%	88.9%
Reduce storage costs	24.4%	20.7%	20.9%	23.1%	0%	55.6%
Improve vehicle fill utilisation	48.9%	55.2%	53.5%	46.2%	33.3%	77.8%
Allow for easier response to demand fluctuation	31.1%	24.1%	30.2%	30.8%	33.3%	77.8%
Lower carbon emissions	16.7%	17.2%	14.0%	38.5%	33.3%	66.7%
Reduce administrative costs	28.9%	10.3%	27.9%	7.7%	0%	55.6%
Other	13.3%	10.3%	14.0%	7.7%	0%	22.2%

Table 4.5: Drivers of horizontal collaboration by company size

It can be seen from Table 4.5 that for many of the drivers, size of company does not appear to cause a general trend in opinions on the drivers to horizontal collaboration. However, a number of points can be drawn from this table.

- 1) 'The reduction of procurement costs' was a more popular response for smaller companies than larger companies. This is compatible with the literature which suggests that the main advantage of horizontal collaborations including joint procurement is the achievement of economies of scale and lower prices through the placement of a larger order. In the case of large companies they are likely to already have high enough orders and/or purchasing power to be able to obtain these discounts without getting involved in joint procurement.
- 2) 'The reduction of administration costs' was also generally more popular with smaller companies, however, the largest proportion of respondents that indicated this was a driver of horizontal collaboration were from the largest group of companies.
- 3) The lowering of carbon emissions was seen to be more of a driver for larger companies. This is perhaps due to their increased brand presence and the good publicity they are likely to obtain for being able to advertise that they have reduced carbon emission.
- 4) For the smallest companies, 'access to new markets' is a bigger driver for collaboration than enhancing customer service, whereas for all other sizes of companies enhancing customer services was chosen by a higher proportion of respondents.

Turning to other company characteristics which may have influenced the respondents' perception of drivers to collaboration, Figure 4.1 shows the drivers by company type.

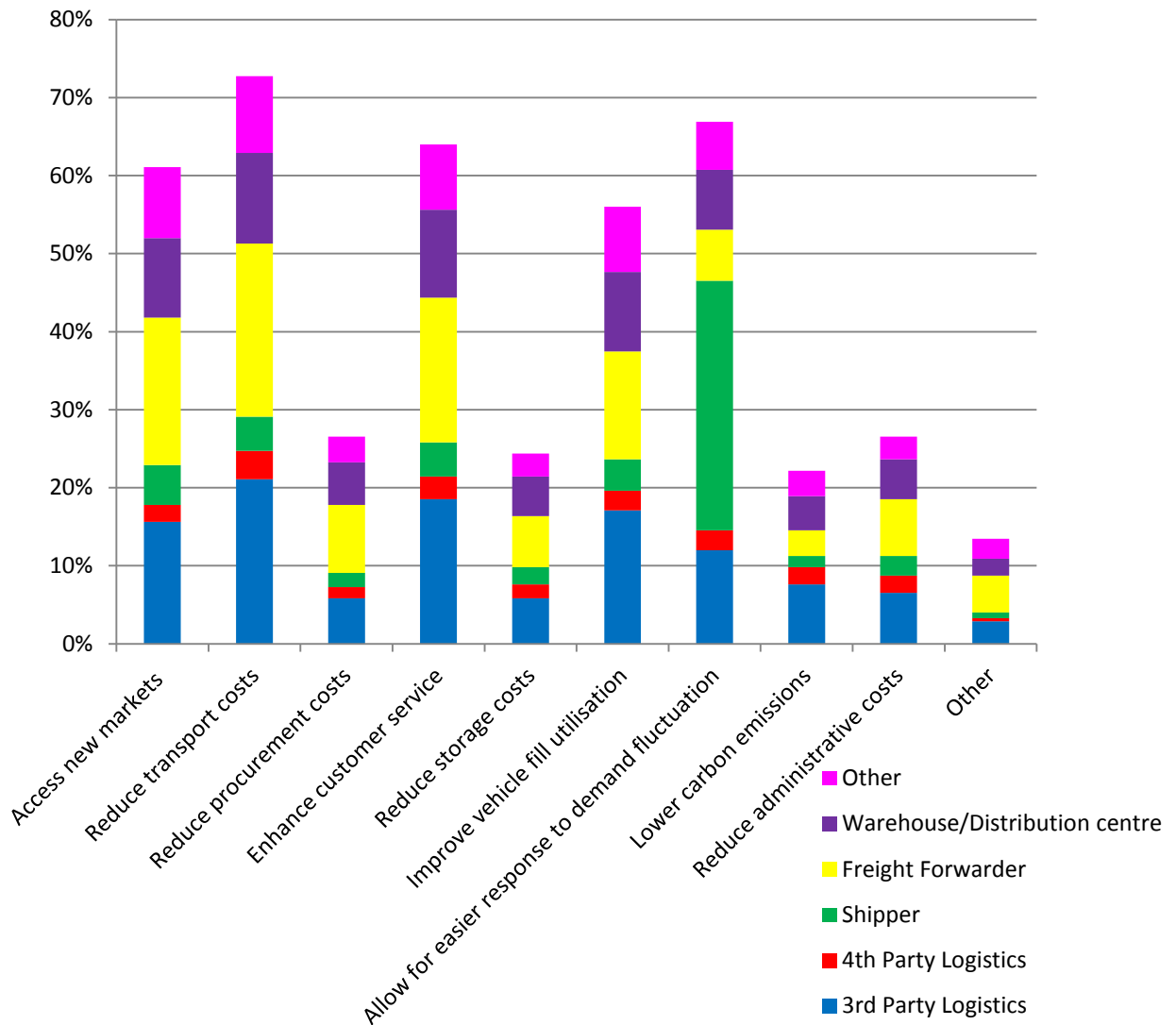


Figure 4.1: Drivers of horizontal collaboration by company type

It can be seen from Figure 4.1 that there were a number of drivers which were more popular within a particular type of company. The ‘easier response to demand fluctuation’ was particularly popular with shippers where 100% of respondents in this category selected this option compared to a general average of 32%. The ‘improvement of vehicle fill utilisation’ was particularly popular among 3rd party logistics providers with 57% of 3PL respondents selecting this option compared to 52% generally.

In contrast to this, the ‘accessing of new markets’ was selected by a significantly lower percentage of 4PLs than other respondents, which can be explained because 4PLs generally have a larger service base geographically than the other types of companies.

4.5 Barriers to Horizontal Collaboration

Respondents were asked to select the factors that they believed were barriers to horizontal collaboration from a list provided. ‘Fear of competitors accessing sensitive information’ at 73% and ‘lack of trust’ at 71% were the two most commonly selected barriers. All of the remaining barriers were selected by less than 30% of the respondents with ‘difficulty in planning what happens at the end of the project’ being the least popular answer with only 8%. Other responses to this question included, ‘limited experienced and trained work force availability’, ‘lack of operational synergy’, and ‘loss of closeness to customers’.

Revenue (in £s)	Under 5 million	5 million – 10 million	11 million – 50 million	51 million – 250 million	251 million – 1 billion	Above 1 billion
Lack of trust	66.3%	75.0%	83.7%	61.5%	66.0%	66.7%
Competitors gaining sensitive company information	70.7%	85.7%	69.8%	76.9%	66.7%	77.8%
Difficulty in finding partners	29.3%	25.0%	30.2%	30.8%	33.3%	11.1%
Loss of closeness to customers	20.7%	14.3%	27.9%	23.1%	33.0%	44.4%
Limited precedence of examples of similar initiatives	13.0%	10.7%	14.0%	0.0%	0.0%	11.1%

Difficulty agreeing terms and conditions of the project	16.3%	10.7%	27.9%	15.4%	0.0%	55.6%
Difficulty in planning what happens at the end of the project	7.6%	3.6%	11.6%	0.0%	0.0%	22.2%
Lack of common processes and systems	17.4%	17.9%	20.9%	38.5%	33.3%	22.2%
Hard to estimate the savings of the cooperation in advance	14.1%	25.0%	25.6%	0.0%	0.0%	33.3%
Management unsupportive of such projects	5.4%	14.3%	14.0%	7.7%	0.0%	11.1%
Other	7.6%	7.1%	7.0%	7.7%	33.3%	22.2%

Table 4.6: Barriers to horizontal collaboration by company size

There are a number of notable points that are illustrated by the data in Table 4.6, firstly, that generally the respondents from larger companies indicated that there were more barriers to horizontal collaboration, than respondents from smaller companies. Barriers that were indicated to be more applicable to large companies were ‘loss of closeness to customer’, ‘difficulty agreeing terms and conditions of the project’, ‘difficulty in planning what happens at the end of the project’, ‘hard to estimate the savings of the cooperation in advance’. The respondents from the largest companies were also the most likely to have described an additional barrier.

Loss of closeness to customers generally was more important to a higher percentage of companies as company size increased. This is excluding the smallest size of company. This is the only driver for which such a simple pattern was seen.

4.6 Types of Horizontal Collaboration

As was discussed in the literature review, this research focuses on four types of collaboration. In the questionnaire one of these, freight consolidation, was split into two categories, complementary freight consolidation and non complementary freight consolidation to help build a better picture of how this initiative is being undertaken in the logistics industry. Table 4.7 shows the percentage of respondents involved in each type of collaboration. From this point onwards in the analysis, percentages are calculated based on the number of respondents who indicated that they were involved in horizontal collaboration. So, for example, in the table 54.8% of respondents involved in horizontal collaboration are involved in freight consolidation rather than 54.8% of the total respondents.

Type of collaboration	Percentage of respondents
Consolidation of complementary freight	54.8
Consolidation of non complementary freight	23.8
Shared services	60.1
Joint procurement	13.7
Joint ventures	16.1
Other	6.5

Table 4.7: Types of collaboration

Table 4.7 shows that ‘shared services’ was the most commonly undertaken form of horizontal collaboration in the logistics industry, with ‘consolidation of freight’, which was expected to score highly as it is specific to the logistics industry coming in second. Both ‘joint procurement’ and ‘joint purchasing’ were seen to be considerably less common practices.

The other responses for this question included joint sales bids and consultancy work, assisting in each other's business requirements and shared individual components in the supply chain.

Given the high percentages of respondents shown in Table 4.7 to be involved in the types of collaboration, it can be seen that the majority of companies were involved in multiple types of collaboration. Table 4.8 illustrates the percentage of respondents indicating involvement in multiple types of horizontal collaboration.

Number of types of collaboration involved in	Percentage of respondents
1	46.1
2	31.9
3	14.2
4	1.8
5	1.8

Table 4.8: Number of types of collaboration

Table 4.8 shows that over half the respondents were involved in multiple types of collaboration, although only a very small percentage were involved in all the types of collaboration. The literature had suggested that companies collaborate in one area and this then grows into multiple types of collaboration, to investigate this the relationships between the types of collaboration in which companies were involved was investigated.

Considering this in further detail, 95% of companies involved in the consolidation of non-complementary freight are involved in another form of collaboration, 91.3% of companies involved in joint procurement are also involved in at least one other type of collaboration, as are 81.4% of companies involved in joint ventures. This figure then drops substantially to 70.9% for consolidation of complementary freight. Shared services is the type of collaboration most likely to be done in isolation although 60.8% of respondents involved in shared services are involved in at least one other type of collaboration. Figures 4.2 to 4.6 show the other types of collaboration in which the companies are involved.

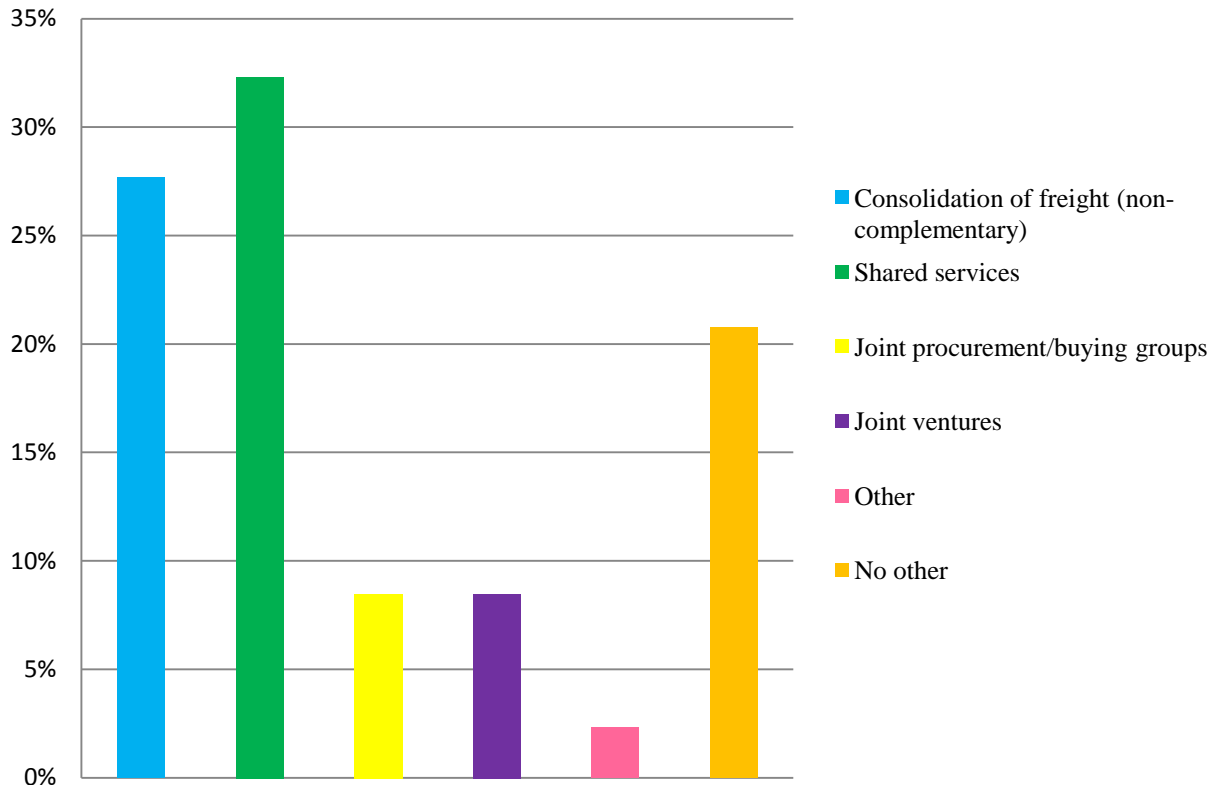


Figure 4.2: Other involvement in horizontal collaboration – consolidation of complementary freight

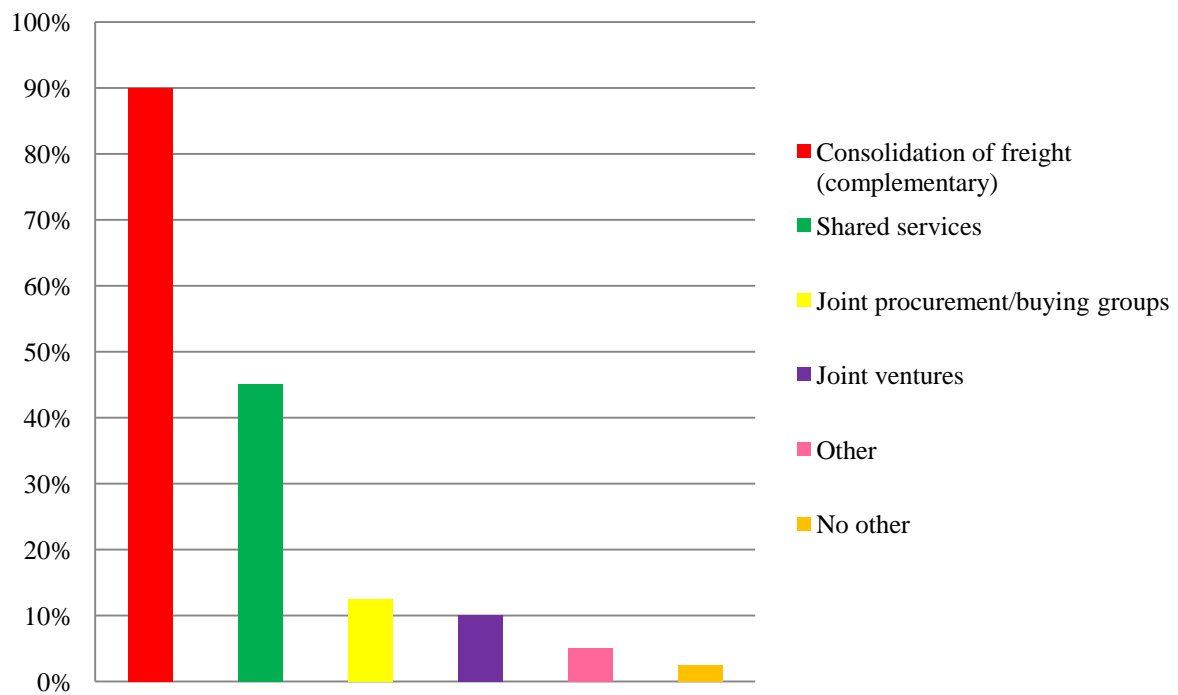


Figure 4.3: Other involvement in horizontal collaboration – consolidation of non-complementary freight

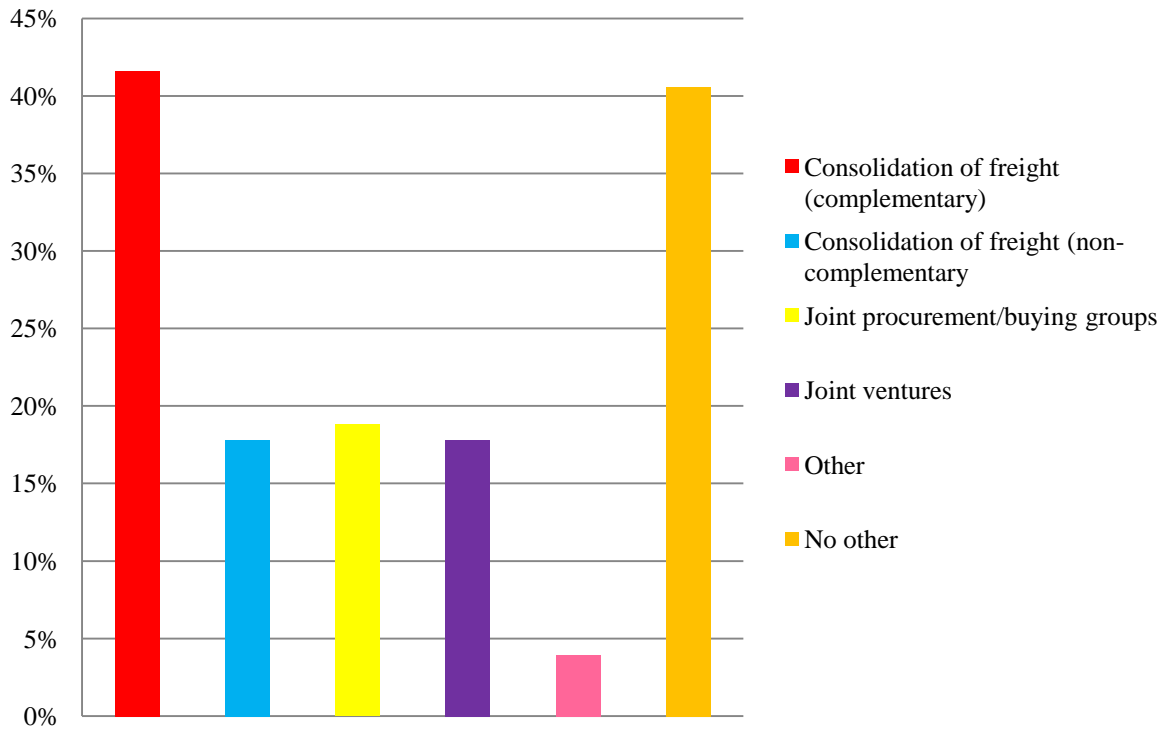


Figure 4.4: Other involvement in horizontal collaboration – shared services

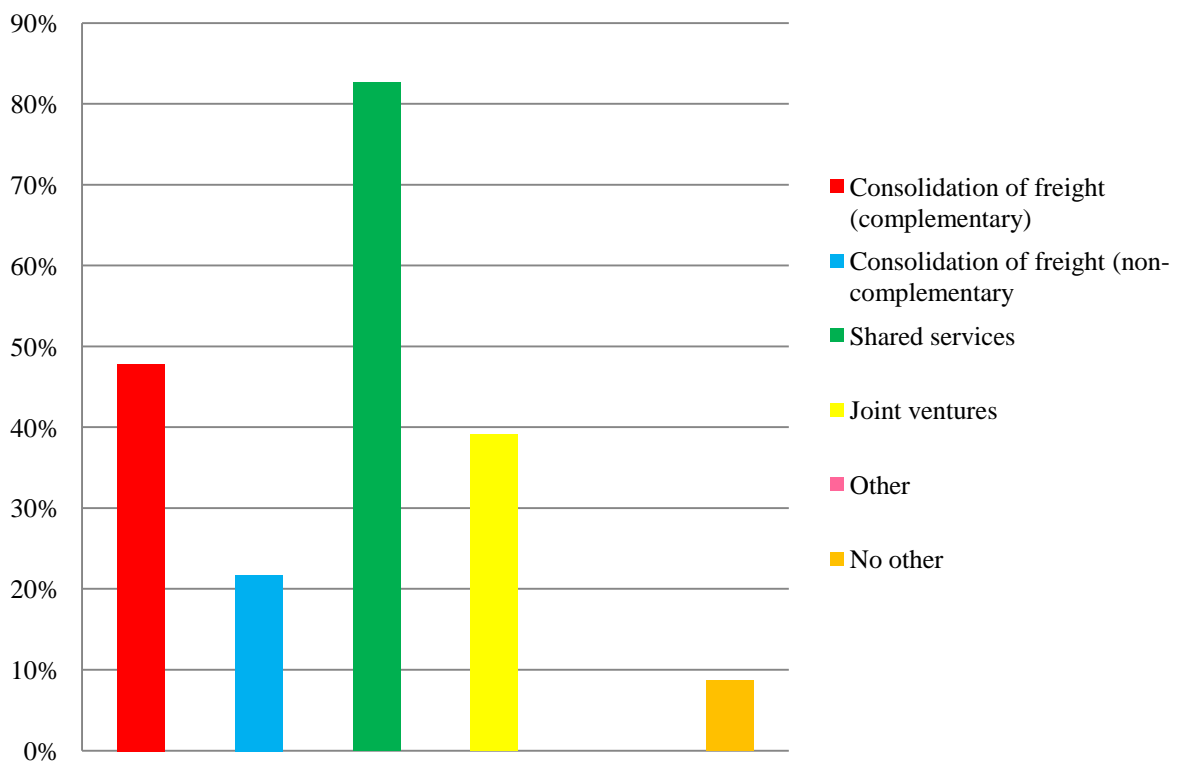


Figure 4.5: Other involvement in horizontal collaboration – joint procurement

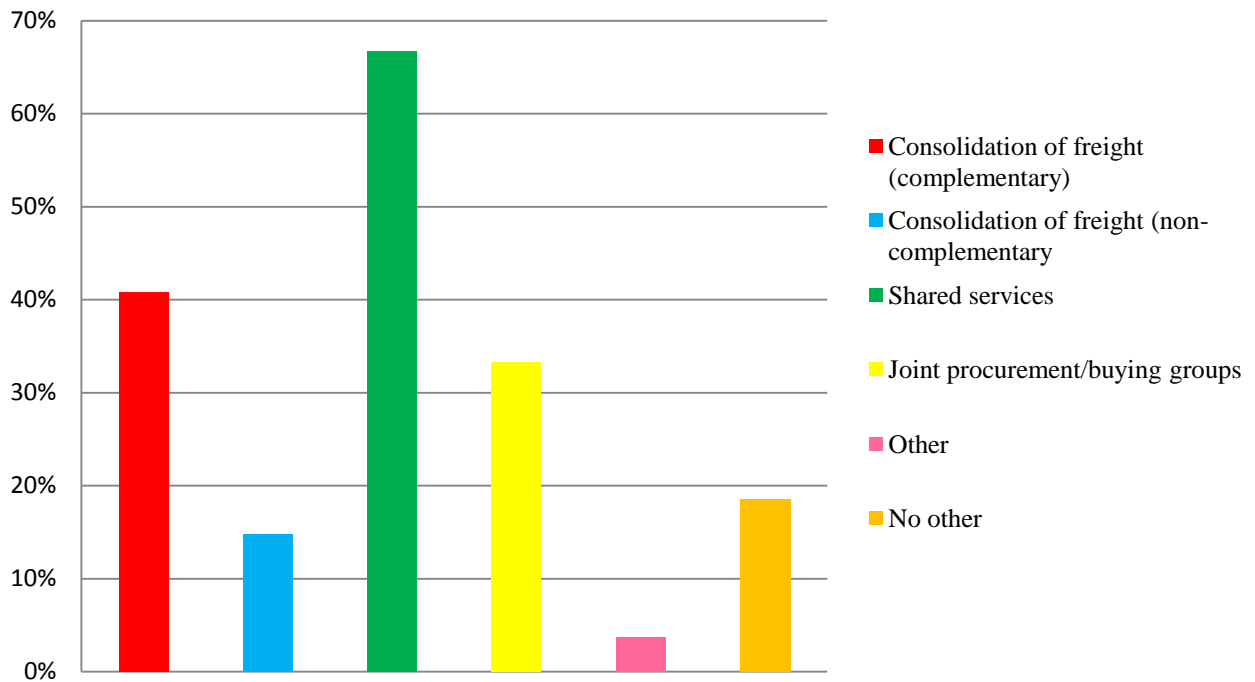


Figure 4.6: Other involvement in horizontal collaboration – joint ventures

It can be seen from Figure 4.2 and 4.3 that a large percentage of respondents were involved in both types of freight consolidation. However, while the percentage of the total respondents undertaking non-complementary freight consolidation that are also undertaking complementary freight consolidation is 90%, the percentage of the total respondents undertaking consolidation of complementary freight that are also undertaking the consolidation of non-complementary freight is much lower at 28%. This can be explained in that companies start with the consolidation of complementary freight which is likely to be more straightforward to implement and then graduate on to the consolidation of non-complementary freight.

Considering the companies involved in consolidation of complementary freight and the consolidation of non-complementary freight, it can be seen that the percentages involved in joint ventures are similar. The percentages also involved in shared services and joint procurement shows that around 10% and 5% less of the respondents involved in the

consolidation of complementary freight and undertaking these compared to those companies involved in the collaboration of non-complementary freight.

In the case of companies involved in shared services it can be seen that consolidation of freight is the most likely additional type of collaboration, with 42% of companies involved in shared services also involved in freight consolidation. This is a significantly higher percentage than the percentage of freight consolidation companies that are also involved in shared services. This could suggest that companies begin their efforts by undertaking freight consolidation and then consider shared services which makes sense as shared services tend to be undertaken more formally, requiring higher levels of collaboration. Joint procurement, joint ventures and the consolidation of non-complementary freight are all undertaken by a similar proportion of the companies undertaking shared services.

The most popular other type of collaboration for companies involved in joint procurement is shared services with 83% of respondents involved in joint procurement also being involved in shared services, however, only 19% of shared services' respondents are involved in joint procurement. It is possible that in some cases as joint procurement collaborations grow they become shared services' collaborations with the sharing of back-office processes linked to purchasing. Alternatively, it is possible that some level of joint procurement can occur in shared services projects. The undertaking of complementary freight consolidation and joint ventures are also popular among companies undertaking joint procurement. Given the low percentage of respondents undertaking solely this type of collaboration it is possible that joint procurement could occur as a side project in addition to the other types of collaboration. For example, freight consolidation could be increased to involve joint procurement of fuel, a joint venture could lead to the buying of some supplies for the joint venture company and the parent companies being amalgamated and placed as one order.

The majority of companies involved in joint ventures were also involved in shared services suggesting companies might undertake shared services and then go on to form more complex collaborations such as joint ventures. Joint procurement is a much more popular form of collaboration for companies involved in joint ventures than for companies involved in other types of collaboration. Again this could be explained by joint procurement projects being a natural addition to joint ventures.

Table 4.9 considers the percentage of respondents undertaking each type of collaboration by company size; research considered in the literature review had considered how SMEs implement horizontal collaboration differently to larger companies so it was thought to be useful to examine the types of collaboration most popular with each size of company.

	Under 5 million	5 million – 10 million	11 million – 50 million	51 million – 250 million	251 million – 1 billion	Above 1 billion
Consolidation of complementary freight	48.8%	64.3%	57.9%	72.7%	66.7%	44.4%
Consolidation of non-complementary freight	11.3%	28.6%	39.5%	36.4%	33.3%	33.3%
Shared services	65.0%	50.0%	71.1%	45.5%	0%	44.4%
Joint procurement	10.0%	17.9%	21.1%	9.1%	0%	11.1%
Joint ventures	13.8%	14.3%	18.4%	9.1%	33.3%	33.3%

Table 4.9: Type of collaboration by company size

The consolidation of complementary freight shows no particular bias in terms of the size of companies, with the largest and smallest companies being the least likely to adopt it. The consolidation of non-complementary freight is much less likely to be undertaken by the

smallest companies. This type of freight consolidation would be more difficult to co-ordinate and plan and small companies often do not have the resources to do this.

Implementation of shared services reduces as the company size increases, whereas, generally joint venture implementation shows the opposite pattern. Joint ventures require considerable expertise, time and money in drawing up legal contracts whereas shared services can be undertaken without as high level of cost and expertise, which would be more appealing to smaller companies.

Joint procurement was not, as perhaps would be expected, undertaken most by the smallest companies; instead the second and third smallest size categories had the highest percentages of respondents undertaking horizontal collaboration. This suggests that there is a minimum size a company needs to be for this to be effective, below a certain size the joined orders may still not be large enough to get a substantial discount or the time and resources taken to set up and maintain the collaboration may negate the benefits of the collaboration. It is also interesting to note that the percentage of the largest size companies undertaking joint procurement is only 2.6% lower than the average suggesting there are benefits to be gained from joint procurement even for the largest companies.

Considering other company characteristics that may influence the type of horizontal collaboration a company is likely to undertake, Table 4.10 shows the percentage of each type of company that were undertaking each initiative.

	3PL	4PL	Shipper	Freight Forwarder	Warehouse/ distribution centre
Consolidation of complementary freight	47.6%	60.0%	52.9%	46.8%	51.0%
Consolidation of non-complementary freight	28.0%	60.0%	5.9%	13.8%	21.6%
Shared services	43.9%	50.0%	47.1%	44.7%	52.9%
Joint procurement	8.5%	40.0%	23.5%	12.8%	13.7%
Joint ventures	14.6%	40.0%	29.4%	13.8%	25.5%

Table 4.10: Type of collaboration by company type

Table 4.10 shows that, generally 4PLs are more open to all the forms of collaboration than other types of company, as a higher percentage of 4PLs indicated they were involved in each type of collaboration than the average percentage. It is possible that in some cases they are facilitating these types of collaboration rather than undertaking them themselves. For example, 4PLs tend to be large companies with a high number of customers and are in a position to help their customers pool orders or share warehouses as in the example mentioned in the literature review where Tetley, Kelloggs and Kimberley-Clark are sharing warehouses which is an initiative that has been overseen by their mutual logistics partner, Norbert Dentressangle.

In contrast to this, freight forwarders are the least likely to be involved in nearly all types of collaboration, with a lower percentage of freight forwarders undertaking each type of collaboration than the overall average, with the exception of consolidation of non-complimentary freight. This is perhaps an unexpected result, as freight forwarders tend to only provide partial transport solutions so could gain significantly from collaborating with competitors offering complementary services to allow them to bid for contracts beyond the scope of their own operations.

Implementation of joint procurement amongst 3PLs is significantly lower than for the other types of company, which could possibly be attributed to the fact that 3PLs are likely to be larger companies, however, earlier results and the fact that 4PLs are undertaking joint procurement makes this unlikely. It is possible that the difference between a 3PL and a 4PL explains this with 4PLs being supply chain coordinators rather than service providers they could be in a better position to facilitate collaboration between their customers.

The percentage of shippers undertaking joint procurement and joint ventures is significantly higher than the average. Moreover, the percentage of shippers undertaking consolidation of non-complementary freight is 17.9% lower than the overall average.

Companies described as warehouse/distribution centres are less likely than other types of company to be involved in both types of consolidation of freight. However, this is only by a small percentage, suggesting a considerable percentage of companies that offer warehousing and distribution facilities also offer some form of transportation services. This is supported by the statistics as two thirds of the respondents that classified their company as a warehouse/distribution centre also classified their company as at least one of the other four options.

A further analysis was carried out to see if the drivers to horizontal collaboration differed for the different types of collaboration. This is shown in Table 4.11.

	Consolidation of complementary freight	Consolidation of non- complementary freight	Shared services	Joint procurement	Joint ventures
Access new markets	62.4%	60.0%	66.3%	78.3%	81.6%
Reduce transport costs	80.6%	82.5%	74.3%	73.9%	81.5%
Reduce procurement costs	29.0%	32.5%	30.7%	65.2%	40.7%
Enhance customer service	71.0%	77.5%	72.3%	73.9%	66.7%
Reduce storage costs	24.7%	25.0%	31.7%	26.1%	33.3%
Improve vehicle fill utilisation	65.6%	62.5%	53.5%	39.1%	63.0%
Allow for easier response to demand fluctuation	40.9%	42.5%	33.7%	34.8%	48.1%
Lower carbon emissions	25.8%	30.0%	20.8%	26.1%	33.3%
Reduce administrative costs	25.8%	40.0%	28.7%	39.1%	40.7%

Table 4.11: Drivers by type of collaboration

Some of the differences in the strengths of the drivers to each type of collaboration are obvious. For example, ‘reduction of procurement costs’ was selected by a higher percentage

of respondents undertaking joint procurement than any other type of collaboration. However, companies undertaking joint procurement did also consider factors such as accessing new markets to be important. This is due to the fact that most respondents were undertaking multiple types of collaboration and the question about drivers did not ask for specific drivers to each type of collaboration.

The most important drivers for companies involved in the consolidation of complementary freight were the ‘reduction of transport costs’ and the ‘enhancement of customer service’, which were the two most popular overall. This was the same for consolidation of non-complementary freight, suggesting these two types of collaboration bring very similar benefits. It was also the same for shared services.

Both joint procurement and joint ventures respondents indicated that ‘accessing new markets’, the third most popular overall response was the main driver. For joint ventures this agrees with the literature with many joint ventures being set up to allow one or more of the companies to access a new market. The response for joint procurement is more difficult to explain and has been influenced heavily by the fact that very few respondents indicated that they solely were undertaking joint procurement, meaning the drivers they picked will have been for the multiple types of collaboration in which they are involved.

4.7 Horizontal collaboration features

This section explores in more detail some of the features of horizontal collaboration projects including resources shared, number of horizontal collaboration projects and collaboration duration.

4.7.1 Resources shared

The first feature that was analysed was the resources respondents indicated they were sharing in the collaborations in which they are involved.

Resource	Percentage of Respondents
Truckloads	61.8%
Containers	32.4%
Pallets	37.0%
Warehouses	55.5%
Forecasting and demand planning information	11.0%
Suppliers	24.3%
Back office resources	18.5%
Other	6.9%

Table 4.12: Resources shared

This questionnaire has found the most popular shared resource to be truckloads; this is an unexpected result as many companies advertise that they are part of the pallet network, so the expectation was that this would be the most popular resource shared but both truckloads and warehouses were much more popular options. Sharing forecasting and demand planning information was the least undertaken resource sharing. This is a more abstract form of collaboration with less tangible benefits which is likely to account for this.

Whilst warehouse sharing is shown as one category in Table 4.12 in order to show how it compared with other forms of resource sharing, respondents were specifically asked to indicate if they were sharing both warehouses belonging to them and warehouses belonging to their partners. Sharing warehouses belonging to the partner company rather than the respondent company was slightly more popular with 39.8% of respondents selecting this option compared to 37.6%. Of the respondents that indicated they were sharing warehouses 38% were sharing both warehouses belonging to their partners and warehouses belonging to their company.

Other responses to this question included labour, overseas agents, rates negotiated in the form of joint procurement and specialist services.

Considering factors that may affect the types of resource shared, Table 4.13 considers how the size of the company affects the types of resource sharing that the company is involved in.

	Under 5 million	5 million – 10 million	11 million – 50 million	51 million – 250 million	251 million – 1 billion	Above 1 billion
Truckloads	59.0%	60.7%	61.5%	57.1%	33.3%	88.9%
Containers	33.7%	25.0%	25.6%	35.7%	66.7%	44.4%
Pallets	38.6%	46.4%	33.3%	35.7%	33.3%	33.3%
Warehouses (belonging to partners)	44.6%	28.6%	28.2%	35.7%	33.3%	33.3%
Warehouses (belonging to your company)	30.1%	35.7%	46.2%	28.6%	33.3%	77.8%
Forecasting or demand planning information	6.0%	10.7%	17.9%	0.0%	0.0%	44.4%
Suppliers	22.9%	32.1%	20.5%	7.1%	0.0%	55.6%
Back office resources	15.7%	21.4%	17.9%	0.0%	0.0%	66.7%

Table 4.13: Resources shared by company size

The smallest companies consistently showed lower than average percentages of respondents involved in each type of resource sharing with the exception of containers and warehouses belonging to partners. The high level of container sharing could be due to the difficulty in generating enough orders to fill a container for a particular destination.

The largest of these differences was for ‘warehouses belonging to your company’. This is not surprising as small companies are less likely to be able to afford their own warehouses particularly ones with spare capacity, which would explain the higher percentage of smaller companies sharing partners’ warehouses. Although horizontal collaboration in terms of

sharing their own warehouse could be used as a survival technique for small companies that are experiencing a decrease in business.

The largest companies returned a higher than average percentage for every type of resource sharing with the exception of ‘warehouses belonging to your partners’. However, the percentage of the largest companies sharing their own warehouses with their partners was 32.4% higher than the average. Larger companies will have more money to spend on infrastructure and it seems logical that they would choose to share their own warehouses to increase the utilisation of assets rather than share another companies warehouses.

The other resource categories that the largest companies utilised to a much higher extent than smaller companies were ‘back office resources’ and ‘suppliers’. Back office resources in particular suggests a higher level of collaboration, suggesting again that larger companies are more capable of implementing the higher forms of collaboration.

To investigate this further, the average number of types of resources that each respondent size category indicated they were participating in was calculated, as the much higher scores for the larger companies suggested that each company was involved in multiple initiatives. This is shown in Table 4.14.

Company Size	Average number of resource sharing initiatives selected
Under 5 million	2.51
5 million – 10 million	2.71
11 million – 50 million	2.51
51 million – 250 million	2.27
251 million – 1 billion	2.00
Above 1 billion	4.89

Table 4.14: Average number of resource sharing initiatives by company size

Table 4.14 does not show a direct relationship between size of a company and the number of types of collaborative initiative that the company is involved in. However, the average number of resource sharing initiatives companies are involved in is significantly higher for the largest companies than for companies of any other size. Of the largest companies, around 22% indicated that they were involved to some degree in all the types of resource sharing initiatives. Larger companies have more resources that can be used to implement horizontal collaboration and are also likely to bring more benefits of collaboration to the negotiating Table thus making them more popular as a choice of partner, especially if they have a proven track record in multiple types of collaboration.

As with the types of collaboration, the effect the type of company had on the resource sharing initiative they were involved in was considered. This is shown in Table 4.15.

	Consolidation of complementary freight	Consolidation of non- complementary freight	Shared services	Joint procurement	Joint ventures
Truckloads	100%	100%	98.3%	94.9%	100%
Containers	28.8%	42.9%	63.6%	90.7%	50.0%
Pallets	57.6%	57.1%	54.5%	64.1%	75.0%
Warehouses (belonging to partners)	47.5%	100%	63.6%	89.7%	71.4%
Warehouses (belonging to your company)	54.2%	100%	45.5%	66.7%	89.3%
Forecasting or demand planning information	20.3%	71.4%	27.3%	12.8%	32.1%
Suppliers	33.9%	100%	45.5%	51.3%	57.1%
Back office resources	30.5%	71.4%	45.5%	25.6%	35.7%

Table 4.15: Resource sharing initiatives by company type

Table 4.15 shows that, as would be expected, all of the companies involved in consolidation of complementary freight and consolidation of non-complementary freight are sharing truckloads. Container and pallet sharing were most popular among companies involved in joint procurement and joint ventures.

Companies involved in joint ventures showed high levels of warehouse sharing, particularly in terms of warehouses belonging to their own company. Companies involved in joint ventures are also more likely to be involved in sharing forecasting or demand planning information and suppliers than companies undertaking other forms of collaboration.

Due to the fact that the majority of respondents indicated that they were involved in multiple types of collaboration and were sharing multiple resources, it is difficult to draw conclusions from Table 4.15. One point of potential interest is that sharing back office resources was considerably more popular among companies consolidating non-complementary freight than those consolidating non-complementary freight. This could indicate that due to the added complexities of consolidating non-complementary freight, companies need to share back office processes and resources to facilitate this.

4.7.2 Number of horizontal collaboration projects

Having established that the majority of companies were undertaking multiple types of horizontal collaboration and multiple resource sharing initiatives, the next question considered is the number of horizontal collaboration projects the company is involved in. This question helps to explore whether companies are involved in horizontal collaboration projects that include multiple resource sharing initiatives and multiple types of collaboration or whether each type of collaboration is undertaken separately. Table 4.16 shows the responses to this question.

Number of Projects	Percentage of respondents
1	28.1
2	22.2
3	14.1
4 or more	35.6

Table 4.16: Number of projects

Table 4.16 shows that over one third of the respondents indicated that their company was involved in four or more projects, however, a significant percentage of the respondents were only involved in one horizontal collaboration project. To explore this further, Table 18 shows the percentage of respondents indicating they were involved in each of a different number of

projects and the number of types of horizontal collaboration. From complementary freight consolidation, non-complementary freight consolidation, shared services, joint procurement and joint ventures.

Number of types of collaboration					
No of projects	1	2	3	4	5
1	57.5%	30.0%	10.0%	0%	2.5%
2	41.9%	35.5%	12.9%	6.5%	3.2%
3	30.4%	26.1%	39.1%	4.3%	0%
4 or more	50.8%	36.6%	11.5%	0	1.6%

Table 4.17: Number of projects by number of initiatives

It can be seen from Table 4.17 that for up to 3 projects the percentage of respondents indicating that they were only involved in one type of collaboration decreased. For those involved in 4 projects or more, the percentage only involved in one type of collaboration increases again. It is more difficult to discern a definite pattern for any other number of types of collaboration, with the exception of the 3 types of collaboration where the percentage of respondents increases with the number of projects up to the 4 or more level where it decreases again.

Respondents indicating they were involved in multiple projects were also asked whether each project involved roughly the same number of partners, 67.8% indicated that the projects they were involved in were of various sizes compared to 32.2% that indicated that all projects had a similar number of partners.

4.7.3 Duration of horizontal collaboration partnerships

Respondents were asked how long on average their horizontal collaboration partnerships lasted. Table 4.18 illustrates the responses to this question.

Average duration of partnerships	Percentage of respondents
Short term (one year or less)	28.7
Medium term (two years to five years)	38.4
Long term (more than five years)	32.9

Table 4.18: Partnership duration

Table 4.18 does not show significant differences between the percentages of respondents involved in short, medium and long term projects, with less than 10% between the highest percentage and lowest percentage.

To explore this further, this data was analysed by type of collaboration in which the company is involved in to determine if average project duration differed by type of collaboration. This is shown in Figure 4.7.

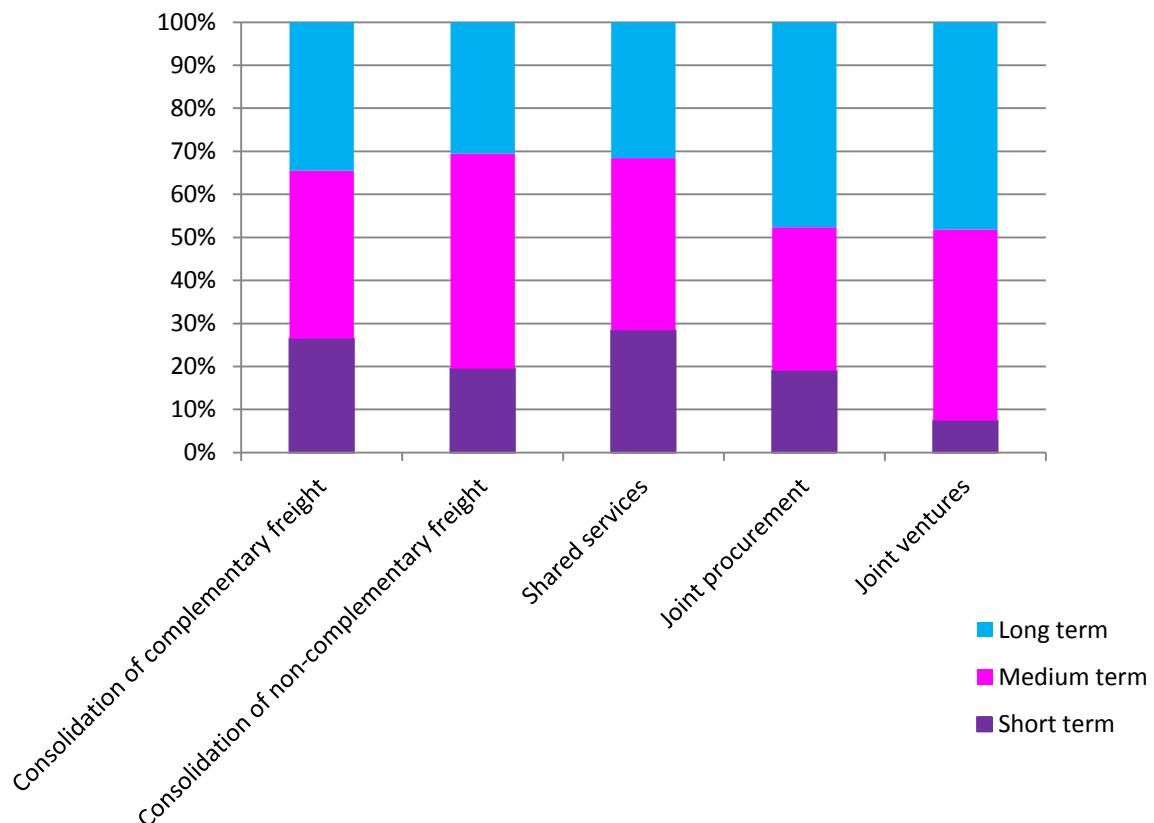


Figure 4.7: Project duration by type of collaboration

As would be expected, joint ventures are the least likely type of collaboration to be undertaken in short-term projects. This is due to the complexity of the agreements needed for joint ventures to be undertaken. The most common type of collaboration for short-term projects is shared services.

Consolidation of non-complementary freight is the most likely form of collaboration to be undertaken in a medium-term project whilst joint ventures and joint procurement are the most likely to be undertaken as long-term collaborations.

4.8 Maturity of Horizontal Collaboration Practices

In the initial questionnaire, respondents were asked to indicate how long their company had been involved in horizontal collaboration. This was presented as a categorical question which was then further explored in the follow-up questionnaire. The distribution of responses in the initial questionnaire are shown in Figure 4.8.

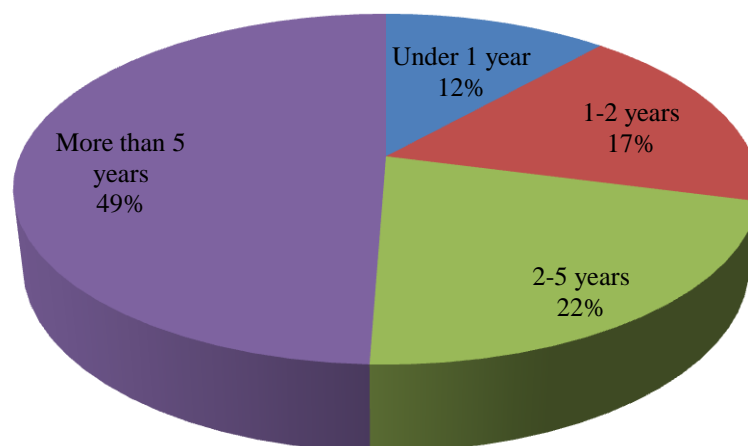


Figure 4.8: Length of time involved in horizontal collaboration

It can be seen from Figure 4.8 that horizontal collaboration is a well established practice, with the majority of respondents indicating that their company has been involved in horizontal collaboration for over 5 years. Due to the majority of respondents indicating that they had

been involved in horizontal collaboration for over 5 years, an open-ended version of this question was asked in the follow-up questionnaire and the results of this will be discussed in Chapter 5.

4.9 Partner Attributes

The first question that was asked which related to the partners a company was involved in horizontal collaboration with, was simply the number of partners the respondent's company had. This is shown in Figure 4.9.

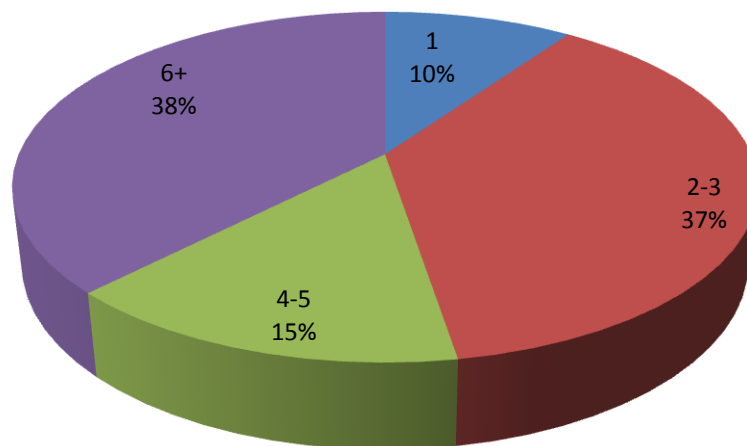


Figure 4.9: Number of partners

Figure 4.9 shows that 90% of the respondent companies are involved in horizontal collaboration with more than one other company. Over one third of the respondents indicated that they had 6 or more partners. For this reason, an open ended version of this question was asked in the follow-up questionnaire and further analysis by number of partners will be shown in Chapter 5 with the results from the follow-up questionnaire.

Respondents were also asked to indicate the relative location of their partners; the results from this question are shown in Table 4.19.

Partners located	Percentage of respondents
Locally	27.0
In the same region	28.7
In the same country	47.1
In Europe	25.9
Anywhere else in the world	29.9

Table 4.19: Location of partners

Table 4.19 indicates a difference between the results of this study and literature concerned with manufacturers' and retailers' collaboration in terms of their logistics facilities/services. In the case of manufacturers and retailers collaboration in terms of the logistics function, they tend to collaborate with companies who have or who need services in a similar area to them. However, in the case of logistics companies collaborating this seems to be a more unpopular location for partners, with 44% of the respondents indicating they were not collaborating with any partners who were located locally or within the same region.

This suggests that logistics companies are collaborating to increase the range of the services they offer geographically or are involved in back hauling rather than the consolidation of freight to fill a vehicle or increasing the efficiency of non-core processes.

Whilst collaborating with companies that are geographically close does not appear to be particularly popular, collaborating with companies in the same country is more popular than collaborating with companies in different countries. This is illustrated by Figure 4.10.

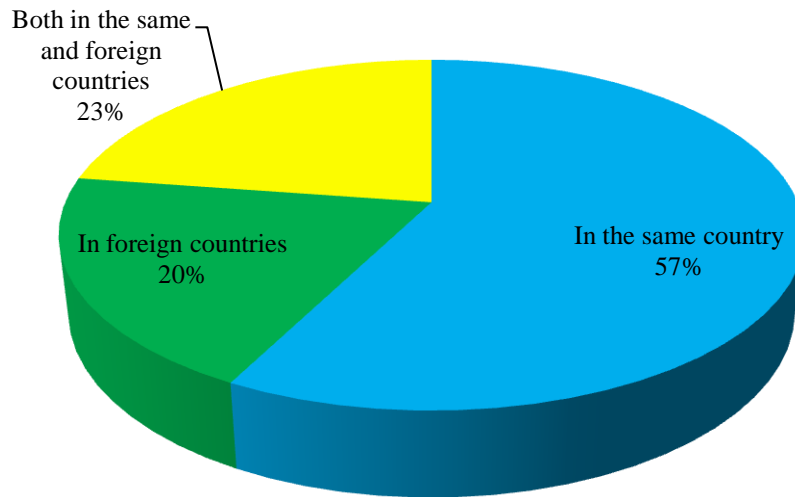


Figure 4.10: Collaborating in the same country vs. collaborating in foreign countries

Figure 4.10 shows that 73% of companies were collaborating with at least one partner in the same country whereas only 43% were collaborating with a company in a foreign country. This is still a significant percentage and suggests that horizontal collaboration is a common practice in the logistics industry worldwide.

Table 4.20 illustrates how the location of partners is influenced by the type of collaboration being undertaken.

	Locally	In the same region	In the same country	In Europe	The rest of the world
Consolidation of complementary freight	18.3%	32.3%	50.5%	31.2%	29.0%
Consolidation of non-complementary freight	15.0%	35.0%	47.5%	30.0%	32.5%
Shared services	29.4%	31.4%	51.0%	27.5%	31.4%
Joint procurement	21.7%	13.0%	47.8%	26.1%	39.1%
Joint ventures	22.2%	22.2%	55.6%	33.3%	55.6%

Table 4.20: Location of partners by type of collaboration

Table 4.20 shows that joint ventures are the most likely form of collaboration to be undertaken with foreign partners. This is not a surprising fact as much of the literature that was reviewed on joint ventures concentrated on collaboration with a foreign partner. Consolidation of complementary freight is the least likely to be undertaken with partners outside of Europe and is generally undertaken with partners in the same country.

Consolidation of complementary freight and consolidation of non-complementary freight are the least likely to be undertaken with local partners. This suggests that companies are using freight consolidation to increase their geographic range by working with partners who have services in different geographical areas.

Shared services is more likely to be undertaken with domestic partners, sharing back office processes or services will require a high level of synergy and cultural fit between the partner companies which may make this type of collaboration easier to implement with companies in the same country who will share some of the same cultural factors.

Table 4.21 analyses whether size of the company has any impact on the likely location of the partners they are collaborating with.

	Locally	In the same region	In the same country	In Europe	The rest of the world
Under 5 million	35.7%	27.4%	41.7%	27.4%	27.4%
5 million – 10 million	32.1%	39.3%	57.1%	28.6%	28.6%
11 million – 50 million	12.8%	33.3%	46.2%	17.9%	17.9%
51 million – 250 million	16.7%	8.3%	66.7%	41.7%	41.7%
251 million – 1 billion	0%	33.3%	33.3%	33.3%	100%
Above 1 billion	11.1%	22.2%	55.6%	44.4%	66.7%

Table 4.21: Partner location by size of company

Table 4.21 shows that larger companies are more likely to collaborate with partners outside of the country that they are located in. This could conceivably be because they have multiple branches so the partner companies could be in other countries that the company has branches in or it could be because large companies are more likely to be able to spend more time and money on finding potential partners. It is unlikely that a horizontal collaboration agreement will be set up without some face-to-face meetings.

Collaborating with local or regional companies is more popular among small companies; this could be due to small companies having more to gain from collaborating with other local companies in terms of back of services like the small retailer's marketing programme discussed in section 2.7.3 of the literature review.

Table 4.22 analyses whether type of company has any impact on the location of the partners respondents indicated that they were collaborating with.

	Locally	In the same region	In the same country	In Europe	The rest of the world
3PL	34.7%	29.2%	56.9%	23.6%	20.8%
4PL	10.0%	20.0%	70.0%	30.0%	40.0%
Shipper	26.7%	40.0%	40.0%	20.0%	46.7%
Freight forwarder	25.0%	25.0%	41.3%	26.3%	42.5%
Warehouse/distribution centre	30.3%	36.4%	75.8%	33.3%	33.3%

Table 4.22: Partner location by type of company

Table 4.22 shows that 4PLs are the least likely to be collaborating with companies located locally or in the same region. This is in agreement with the results from Table 20 as 4PLs tend to be large companies. Moreover, 4PLs did not return the highest percentage of companies collaborating outside of Europe as would perhaps have been expected, with 46.7% of shippers collaborating outside of Europe compared to 40%, of 4PLs. Shippers are expected to be collaborating with companies that can help them extend the routes they can offer, therefore their partners are located in different regions or countries to their own company.

3PLs and warehouse/distribution centres showed the highest levels of companies' collaborating with local companies', with warehouse/distribution companies also showing high levels of 'collaboration with companies in the same region'. Warehouse/distribution centres concentrate on providing services to a specific geographical area and are therefore likely to collaborate with local partners to enhance the efficiency of these operations. However, there might be cases where they collaborate with a company with warehouses in different locations by both allowing the other a certain amount of space in their warehouses to increase their geographical service range.

Respondents were also asked to indicate whether the companies they were undertaking horizontal collaboration with were generally larger than their company, smaller than their company or a similar size to their company. The highest percentage of respondents, 43.7%, indicated that they were collaborating with companies that are larger than their company, whilst 35.1% indicated that they are collaborating with companies of a similar size and 21.2% indicated that they were collaborating with smaller companies. It can be deduced from this, despite the issues of power and dominance in horizontal collaboration, that could be caused by being the smaller partner in the collaboration, companies would still rather work with a larger partner with more resources and expertise.

Unsurprisingly, size of the respondent company had a strong underlying effect on the relative size of partner companies, with none of the respondents whose companies fell into the two largest size categories collaborating with companies larger than themselves and the majority of these respondents indicating that their partners were normally smaller.

Whilst the smallest companies had the highest percentage of companies collaborating with companies that were larger, at 54%, a significant percentage also indicated that they were collaborating with companies of the same size. All sizes of companies appear to be open to collaborating with companies of a similar size. However, only 25% of the largest companies indicated that they were collaborating with companies of a similar size, due to the smaller number of companies of a similar size at this level in the industry generally, this lower percentage is to be expected.

Considering this data in terms of type of collaboration being undertaken, a number of differences can be seen between the typical partner sizes for the different types of collaboration. These are illustrated by Table 4.23.

	Smaller than respondent's company	A similar size to respondent's company	Larger than respondent's company
Consolidation of complementary freight	37.9%	21.5%	40.5%
Consolidation of non- complementary freight	18.2%	45.5%	36.4%
Shared services	19.3%	34.1%	46.6%
Joint procurement	10.0%	45.0%	45.0%
Joint ventures	41.7%	41.7%	45.8%

Table 4.23: Relative size of partners by type of collaboration

Table 4.23 shows that joint procurement is the least likely initiative to be undertaken with partners that are smaller. This can be explained by the fact that if the partner is too much smaller the order value they will place will not make a significant difference and may not increase the companies' bargaining power or the discount they receive for bulk orders.

The two types of consolidation of freight are the least likely to be undertaken with larger partners, with consolidation of non-complementary freight showing the highest percentage of respondents indicating that they were collaborating with companies of a similar size.

4.10 Cost and Benefit Sharing

Respondents were asked to indicate whether or not in the horizontal collaborations in which they are involved, the costs of the collaboration and the benefits of the collaboration are shared equally. This data is shown in Table 4.24.

	Yes	No
Are the costs shared equally	35%	65%
Are the benefits shared equally	48%	52%

Table 4.24: Cost and benefit sharing data

It can be seen from Table 4.25, that the majority of horizontal collaboration partnerships are not equal, with the majority of projects not sharing the costs of the partnership equally among the partners. The benefit sharing is more likely to be equal, however in over half the cases, benefits are not shared equally.

Table 4.25 illustrates the effect type of collaboration has on the cost and benefit sharing models.

	Costs		Benefits	
	Yes	No	Yes	No
Consolidation of complementary freight	24.4	75.6	48.6	51.4
Consolidation of non-complementary freight	27.7	72.2	40.5	59.5
Shared services	42.5	57.5	54.2	54.8
Joint procurement	60	40	72.7	27.3
Joint ventures	52	48	73.1	26.9

Table 4.25: Cost and benefit sharing by type of collaboration

Joint procurement is the type of collaboration in which costs are most likely to be shared equally among the partners, whilst joint procurement also shows a high level of equal benefit sharing, joint ventures shows a slightly higher level of equal benefit sharing. The consolidation of freight, both complementary and non-complementary, shows the lowest levels of equal cost and benefit sharing. This could be explained, as with consolidation of freight it is more difficult to accurately share out costs due to fluctuating volumes, also if companies have spare capacity they might be willing to allow their partners to use it at a

lower cost than they would normally sell the space to avoid low capacity utilisation and this will mean the costs will not be shared equally.

Joint ventures are more fixed contractually and have strict upfront rules for cost and benefit sharing. Joint procurement is likely to be undertaken on a more formal basis, but in this case, if the companies are placing orders of different sizes, the benefits they get may differ, as the company with the smallest order may benefit the most as the discount the group order will get will be the biggest compared to the price each company would have had to pay individually.

4.11 Termination of Collaboration Projects

Respondents were asked whether they had been involved in a horizontal collaboration project that had ended, 47% of the respondents indicated that they have been involved in a horizontal collaboration that has ended. Figure 4.11 illustrates the reasons these collaborations ended.

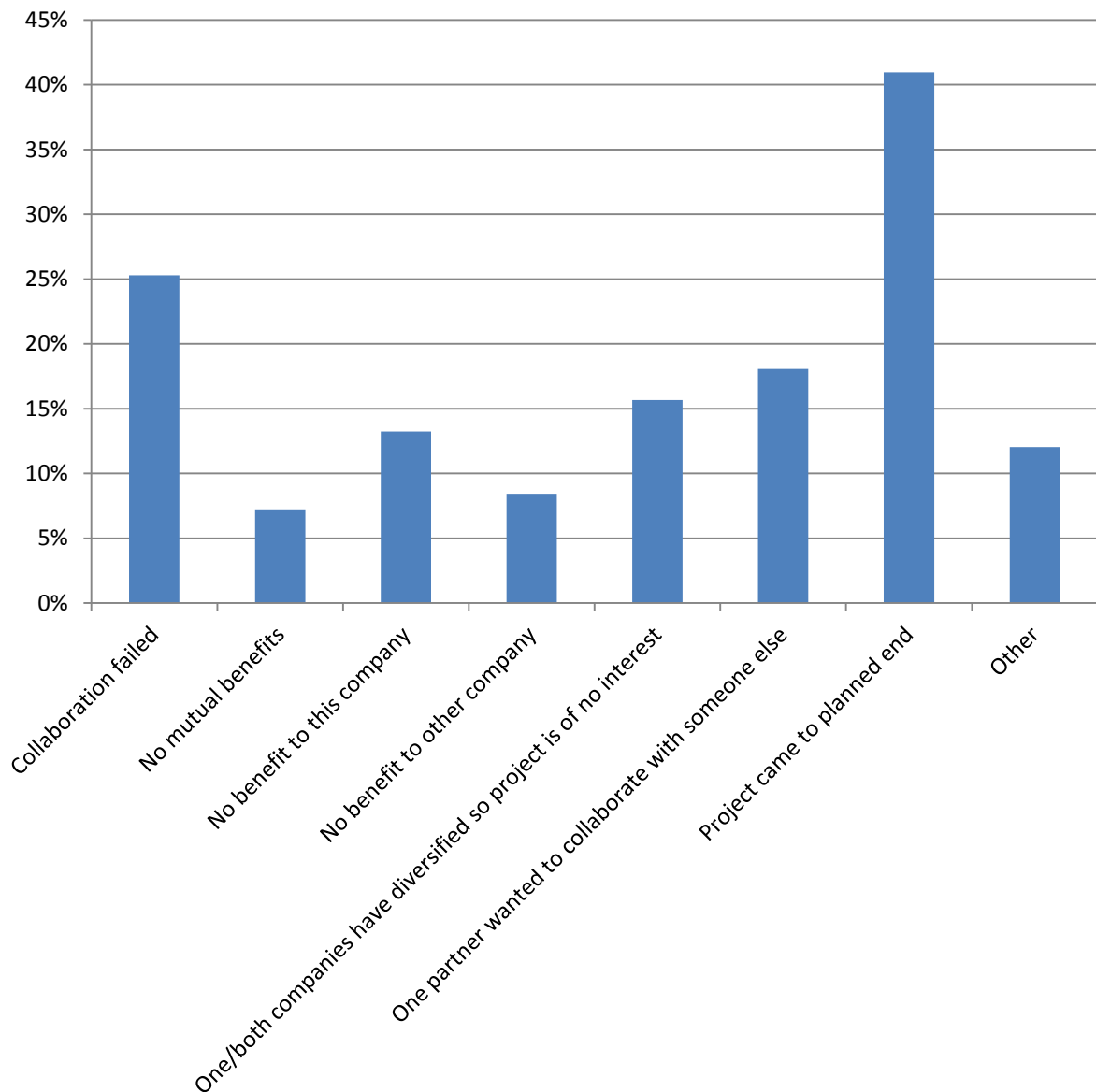


Figure 4.11: Reasons for horizontal collaborations ending

It can be seen from Figure 4.11 that under half of horizontal collaboration projects come to a planned end, with the two main reasons for collaborations failing being one of the partners wanting to collaborate with other companies and diversification of companies leading to the horizontal collaboration being of no interest to the company/ies. This indicated that whilst horizontal collaboration is a mature practice in the logistics industry, it is one that companies are not often able to implement fully successfully and that more research is needed into what

makes horizontal collaboration projects a success. Other responses to this question included ‘lack of trust between partners’, ‘better partner located’, ‘partner went bankrupt or into liquidation’ and ‘lack of communication and shared goals’.

The first underlying factor considered for the reasons collaborations ended was the type of collaboration the companies were involved in. This is shown in Table 4.26.

	Consolidation of complementary freight	Consolidation of non- complementary freight	Shared services	Joint procurement	Joint ventures
Collaboration failed	23.4%	19.0%	28.3%	11.1%	10.0%
No mutual benefits	4.3%	9.5%	8.7%	11.1%	30.0%
No benefit to this company	14.9%	9.5%	13.0%	33.3%	20.0%
No benefit to other company	6.4%	14.3%	8.7%	11.1%	10.0%
One/both companies have diversified so project is of no interest	14.9%	9.5%	19.6%	22.2%	40.0%
One partner wanted to collaborate with someone else	14.9%	19.0%	23.9%	11.1%	20.0%
Project came to planned end	38.3%	38.1%	37.0%	33.3%	10.0%

Table 4.26: Reasons for horizontal collaborations ending by type of collaboration

Joint ventures are the least likely project to come to a planned end by a significant percentage. This could be explained by the fact this type of collaboration tends to be done on a more formal basis and have a definite set finish date, making it easier to measure whether the project came to a planned end or not. For other types of collaboration the ‘planned end’

could be a much more fluid concept. In the literature review, it was established that the failure rates for joint ventures were generally very high, but not as high as has been seen in this research, suggesting joint ventures between logistics companies are less successful than in other industries.

Given this low level of joint ventures coming to a planned end, it is interesting to note that respondents involved in joint ventures also had the lowest percentage of instances where they indicated that the collaboration had failed, with the majority of collaborations ending due to partner diversification. This suggests that while joint ventures in the logistics industry do not last until the planned end, they do end with agreement between the parties having each reaped benefits from the collaboration. This would fit with examples where the joint venture company is sold off or bought out by one company. A simple search of news items provides examples of this that include the joint venture between TNK and BP which ended in 2012, when BP chose to exit the Russian market to concentrate on other markets and sold its share to another Russian company (Goodley, 2012). This year has also seen the sale of E.ON and RWE's joint venture in the UK, Horizon Nuclear Construction, to exit what they see as a risky market (Deutsch Welt, 2012).

Shared services is shown to be the type of collaboration most likely to fail. This is contradictory to some of the literature which suggested that collaboration in terms of non-core processes were likely to be the most successful types of collaboration.

It can be theorised from Table 4.26 that consolidation of complementary freight is the most effective type of collaboration being undertaken in the logistics industry as it is the least likely type of collaboration to provide no mutual benefits to the companies involved and has the highest percentage of collaborations coming to a planned end. It also had low percentages for 'no benefit to other company', 'diversification of companies' and 'one

partner wanted to collaborate with someone else'. It does, however, show the second highest percentage of failed collaborations

The consolidation of non-complementary freight also appears to be a very effective type of collaboration, with low percentages for 'failed collaborations', 'no mutual benefits', 'no benefits to this company' and 'companies diversified', whilst showing a high percentage of collaborations 'coming to a planned end'.

Joint procurement shows a high level of collaborations which turn out to bring no benefit to the respondent company, suggesting that bulk discounts are not common from suppliers to this industry or that logistics companies spend so much time and money setting these collaborations up and maintaining them that they cost more or the same as the potential savings.

Table 4.27, considers the responses to this question by size of companies. Due to the low number of responses to this question by the respondents in the top two size categories, these two categories have been amalgamated.

	Under 5 million	5 million – 10 million	11 million – 50 million	51 million – 250 million	Over 250 million
Collaboration failed	20.0%	44.4%	23.5%	16.7%	50.0%
No mutual benefits	8.9%	0.0%	5.9%	16.7%	16.7%
No benefit to this company	6.7%	0.0%	5.9%	16.7%	33.3%
No benefit to other company	2.2%	44.4%	0.0%	0.0%	33.3%
One/both companies have diversified so project is of no interest	11.1%	22.2%	11.8%	33.3%	16.7%
One partner wanted to collaborate with someone else	13.3%	22.2%	17.6%	50.0%	33.3%
Project came to planned end	51.1%	11.1%	5.9%	16.7%	66.7%

Table 4.27: Reasons for horizontal collaborations ending by size of company

Table 4.27 shows very mixed results, with no obvious relationship between any of the reasons and size of the company. There are, however, a few interesting results, the largest companies reported the largest percentage of project failures but also the highest level of projects coming to a planned end. This could mean that horizontal collaboration projects that are not proving as successful as anticipated get terminated quickly in larger companies whereas smaller companies may continue until the end. It also perhaps highlights a weakness in the questionnaire, where perhaps different respondents had different definitions of failure, some may believe failure is if the project does not meet all its objectives, others may have defined a failed project as one that was terminated.

The data does show that larger companies are more likely to find that horizontal collaboration projects do not bring them benefits. This is interesting as the literature considers that bigger

companies will often be in a better position to negotiate the terms of a horizontal collaboration project to their advantage and suggest that it is smaller companies with less bargaining power that will see less benefits. In only 6.7% of cases did the smallest company respondents indicate that horizontal collaboration projects were terminated due to lack of benefit for their company. The results also show that in an even lower percentage of cases, 2.2% the collaborations they were involved in ended due to the horizontal collaboration not being beneficial to their partners.

4.12 Chapter Summary

This chapter has presented the results from the initial questionnaire; the main findings from this questionnaire are as follows.

- Horizontal collaboration is a widely undertaken practice in the logistics industry, with the majority of respondents indicating that their company is involved in multiple types of horizontal collaboration with multiple partners.
- Horizontal collaboration is principally used to reduce transport costs, access new markets and to enhance customer service.
- The main barriers to horizontal collaboration are lack of trust and fear of competitors accessing sensitive information about the company. The results also showed that respondents at larger companies believed there were more barriers to horizontal collaboration than respondents at smaller companies.
- Larger companies and 4PLs are more likely to be involved in horizontal collaboration than other sizes and types of companies.
- Shared services and freight consolidation are the most popular forms of collaboration. 53% of respondents indicated they were involved in multiple types of collaboration. Relationships were identified between types of collaboration that are undertaken in

parallel, with 83% of respondents involved in joint procurement also being involved in shared services and 90% of respondents involved in the consolidation of non-complementary freight were also involved in the consolidation of complementary freight.

- The average company shares 2.81 types of resources, with the largest companies sharing on average a significantly higher number of resources. Truckloads are the most common resource shared.
- Most logistics companies which practice horizontal collaboration have been in a horizontal partnerships for more than 5 years.
- The majority of relationships are asymmetric in terms of companies of different sizes working with each other, with companies appearing to prefer to work with companies that are larger than their company to gain access to knowledge and resources.
- A large percentage of respondents were collaborating domestically with a significant percentage collaborating internationally. International collaboration was found to be particularly high among the largest companies.
- In most horizontal collaboration partnerships neither the costs nor the benefits of the collaboration are shared equally amongst the partners.
- Over 50% of horizontal collaboration projects are ending prematurely, suggesting that whilst horizontal collaboration is a well established practice in the logistics industry, more research is needed to establish exactly what makes a horizontal collaboration partnership successful.

CHAPTER 5

RESULTS AND ANALYSIS OF THE FOLLOW-UP QUESTIONNAIRE

5.1 Chapter Introduction

This chapter will present the results and analysis of the follow-up questionnaire. The follow-up questionnaire was undertaken between October and December 2010. Each respondent received a personalised questionnaire, a letter explaining the purpose of the follow-up questionnaire and a freepost envelope in which to return the questionnaire. If a response to this was not received within 3 weeks, a reminder along with a new copy of the questionnaire and another freepost envelope was sent out. This questionnaire was only sent out to respondents of the initial questionnaire that had indicated that they were involved in horizontal collaboration. Ninety responses were received from the follow up questionnaire from a possible one hundred and seventy.

5.2 Effectiveness Scores for horizontal collaboration initiatives

Respondents were asked to indicate on a likert scale the perceived effectiveness of the horizontal collaboration initiatives in which they had indicated they were involved. The likert scale ran from -1 to 3(-1=negative effect, 0=no effect, 1=weak positive effect, 2=moderate positive effect, 3=strong positive effect) as respondents were generally expected to have a positive view on horizontal collaboration but it was thought to be beneficial to give them the option of indicating that they had found a particular type of collaboration to have a neutral or negative effect.

The questionnaires were personalised for each respondent, so that they only scored the types of collaboration that they had indicated an involvement in. This was done to ensure that these scores were based on their actual experience of the types of horizontal collaboration rather

than how effective respondents thought they might be. The average score for each type of collaboration is shown in Table 5.1.

Type of collaboration	Average score	Standard deviation
Consolidation of complementary freight	1.85	0.978
Consolidation of non complementary freight	1.53	1.121
Shared services	1.85	1.088
Joint procurement	1.36	1.165
Joint ventures	2.00	0.913

Table 5.1: Effectiveness of the types of collaboration

Table 5.1 shows that joint ventures were perceived to be the most effective type of horizontal collaboration being undertaken in the logistics industry. Joint procurement received the lowest average effectiveness rating, this was the least undertaken collaboration type and due to logistics companies focusing on providing services rather than physical products, there is considerably less scope for joint procurement in the industry, which perhaps explains this low rating.

It is difficult to explain why the most effective and least effective initiatives appear to be the two least implemented types of collaboration, with 13.7% of companies having indicated that they were involved in joint procurement and 16.1% indicating that they were involved in joint ventures. The only potential explanation is that whilst joint ventures have proved very effective when they have worked, the initial questionnaire showed that a considerable percentage of joint ventures fail. Despite this high level of joint venture failure, the standard deviation for this initiative was the lowest, whilst it would not have been surprising to see high variation for joint ventures due to the high level of failures. In addition to this, joint ventures are the most formal type of horizontal collaboration considered in this research and therefore the most time consuming and costly to implement, which could explain why despite

the high perception of their effectiveness they are not as commonly undertaken as other forms of horizontal collaboration.

Consolidation of complementary freight and shared services, despite being the most popular types of collaboration, only received an equal second most effective score, with the consolidation of non-complementary freight being rated as slightly less effective. This could be due to the additional complexities and difficulties of organising the consolidation of non-complementary freight.

Generally the higher the average scores for the initiative the lower the variation, with the highest standard deviations being seen for consolidation of non-complementary freight and joint procurement. This suggests that part of the reason the effectiveness score is lower is because this type of initiative does not provide consistent returns, it could therefore be suggested that these are the more difficult initiatives to implement successfully in the logistics industry and that the success of these initiatives relies on other factors.

Having seen a difference in the mean scores between the different types of initiative, a kruskal-wallis test was undertaken to determine if the differences between the means were statistically significant. A kruskal-wallis test was undertaken rather than an ANOVA test, due to the fact that the data being analysed did not have a normal distribution and thus an ANOVA test would be unreliable. This returned a value of 0.60 leading to the null hypothesis of “type of horizontal collaboration having no significant effect on the perceived effectiveness” being retained.

5.3 Effectiveness Scores for Types of Resource Sharing

Respondents were asked to indicate on a likert scale the effectiveness of sharing a number of resources with competitors or potential competitors. The likert scale ran from -1 to 3(-1=negative effect, 0=no effect, 1=weak positive effect, 2=moderate positive effect, 3=strong

positive effect) as for the previous question. Also, in the same way as mentioned previously the questionnaires were personalised for each respondent, so that they only scored the resources that they had indicated that they were sharing, in their responses to the initial questionnaire. This was done to ensure that these scores were based on their actual experience of the types of horizontal collaboration rather than how effective respondents thought they might be. The average scores for each type of resource sharing are shown in Table 5.2.

Resource shared	Average score	Standard deviation
Truckloads	1.93	0.89
Containers	1.63	1.11
Pallets	1.69	1.04
Warehouses (belonging to partners)	1.56	1.12
Warehouses (belonging to respondents company)	1.96	1.01
Forecasting or demand planning information	0.67	1.07
Suppliers	1.78	0.75
Back office resources	1.08	0.88

Table 5.2: Effectiveness of sharing different types of resources

Table 5.2 indicates that sharing a warehouse belonging to the respondent's company and sharing truckloads are perceived to be the most effective form of resource sharing, with forecasting and demand planning information being perceived as the least effective. The sharing of demand planning information was also found to be the least popular form of resource sharing; this could be due to the low perceived effectiveness of this initiative.

To further investigate the relationships between perceived effectiveness and popularity, the rankings of each form of resource sharing in terms of both of these factors were analysed.

Form of resource sharing ranked by popularity	Form of resource sharing ranked by perceived effectiveness
Truckloads	Warehouses (belonging to respondents company)
Warehouses (belonging to partners)	Truckloads
Warehouses (belonging to respondents company)	Suppliers
Pallets	Containers
Containers	Warehouses (belonging partners)
	Pallets
Back office resources	Back office resources
Forecasting or demand planning information	Forecasting or demand planning information

Table 5.3: Popularity ranking compared to perceived effectiveness ranking

The popularity of the forms of resource sharing and the perceived effectiveness do appear to be closely linked with two forms of resource sharing having the same rank in both scorings, two forms only being a single place apart, two being two places apart and only one form of resource sharing, the sharing of warehouses belonging to partners, showing a difference of three places.

The differences in the two forms of warehouse sharing's rankings leads to the potential finding that whilst sharing warehouses belonging to partners is a more popular form of horizontal collaboration, sharing their own warehouses with their partners is perceived as more effective. A potential explanation for this difference could be that the benefits of sharing their own warehouses are easier to quantify, as sharing their own warehouses generates extra revenue, increases efficiency and lowers the overheads the respondent company has to pay. The benefits of sharing a partner's warehouses will pertain mainly to

increasing the company's service range and are therefore more difficult to quantify, explaining the difference seen in Table 5.3.

It can be seen that the two least popular types of collaboration received the bottom two perceived effectiveness ratings, suggesting they are not commonly undertaken because they do not give as good results as other forms of collaboration. This agreement is not seen at the top of the table with truckloads, the most popular form of resource sharing coming second to warehouses belonging to the respondent's company in the perceived effectiveness. However, the difference between these two effectiveness scores was only 0.03.

As in the previous section a kruskal-wallis test was undertaken to test whether the differences in the mean perceived effectiveness were statistically significant, this returned a result of 0.105 and the decision to retain the null hypothesis, thus leading to the conclusion that the effectiveness of the collaboration is the same across all types of resource sharing initiatives.

5.4 Testing of Underlying Factors thought to Influence Perceived Effectiveness

With the type of collaboration and the form of resource sharing having been shown to have no significant statistical effect on the respondents perceived effectiveness of the types of horizontal collaboration, further factors were investigated to see if an underlying reason for the differences in perceived effectiveness could be identified. The factors and results from this testing can be seen in Table 5.4, as with the hypothesis testing undertaken in the previous two sections. This was done using kruskal-wallis tests.

Null hypotheses	Significance	Decision
The effectiveness of horizontal collaboration is the same across companies of all sizes	0.094	Retain the null hypothesis
The effectiveness of horizontal collaboration remains the same for companies with different numbers of partners	0.827	Retain the null hypothesis
The effectiveness of horizontal collaboration remains the same for companies which have been involved in horizontal collaboration for different amounts of time	0.268	Retain the null hypothesis
The effectiveness of horizontal collaboration is independent of the relative size of partners	0.045	Reject the null hypothesis

Table 5.4: Hypothesis testing

It can be seen from Table 5.4 that the factors that were expected to impact on the effectiveness of collaboration such as size of company, number of partners and the amount of time companies have been collaborating did not significantly affect the perceived effectiveness of the collaborations.

This is at odds with some of the literature, which suggested smaller companies may have more to gain from horizontal collaboration than larger companies; however, this could be explained by the potential extra difficulties of implementing horizontal collaboration in small companies. The literature also suggested that companies prefer to collaborate with companies which have proven their horizontal collaboration competencies through collaboration. Companies in the logistics industry believe that the longer a company has been involved in horizontal collaboration and the more horizontal collaboration partnerships the company has been involved in the more successful a horizontal collaboration partnership is likely to be. This research shows that this is not true to any statistically relevant extent. An explanation for this would be the wide scope of horizontal projects; experience in one type of horizontal

collaboration could be completely irrelevant when entering into a different type of horizontal collaboration with different partners.

Table 5.4 did, however show one underlying factor that significantly affects the perceived effectiveness of a horizontal collaboration, which was the relative size of partners. Whilst the kruskall-wallis test confirms a relationship between the relative size of the company's partners and the perceived effectiveness it does not indicate as to the precise nature of the relationship. To test the direction of the relationship, Mann-Whitney U tests were undertaken, the results of these are shown in Table 5.5.

Variables	Mean Rank	Sum of Ranks	Significance
Collaborating with larger companies	41.80	2006.50	Significant
Collaborating with smaller companies	23.89	549.50	
Collaborating with smaller companies	24.43	562.00	Not significant
Collaborating with companies of the same size	40.28	1853.00	
Collaborating with companies of the same size	47.64	2286.50	Not significant
Collaborating with larger companies	47.36	2178.50	

Table 5.5: Mann Whitney U results

Three individual Mann-Whitney U tests were carried out to compare the relative size of partner groups. Only one of these tests showed a significant result, this was the comparison of the perceived effectiveness seen when collaborating with a larger company and when

collaborating with a smaller company. This showed a significantly higher perceived effectiveness in cases where the partner is of a relatively larger size than the respondent company. This was shown to be a more popular option by the number of respondents who indicated that they were collaborating with larger companies. The reason for this significant difference is thought to be due to the increased potential for the smaller company to learn from the larger company due to its higher levels of expertise. In addition to this, the smaller company will potentially have the option to gain access to a wider array of resources through the collaboration than the larger company will be able to access from its smaller partner.

Although the difference in perceived effectiveness between companies collaborating with larger and smaller companies was seen, no significant difference was seen between the perceived effectiveness between companies collaborating with companies of a similar size and companies collaborating with larger or smaller companies. Whilst no significance was seen in either of these cases, the significance result for companies collaborating with smaller companies compared to companies collaborating with companies of similar size showed a significance level of 0.01, meaning the difference was only just outside of the level that would make it significant. In contrast, the significance level for companies collaborating with larger companies compared to companies collaborating with companies of similar size was 0.959 suggesting the difference between these scores was significantly less.

With the differences in the groups for the companies collaborating with smaller partners and companies collaborating with companies of the same type being higher, it can be deduced that collaborating with a smaller company significantly decreases the perceived effectiveness of the collaboration. This could be because the larger partner perceives the smaller partner obtains more from the collaboration or because the larger company had to lead the initial negotiations, setup and monitoring of the collaboration, due to its higher resource levels. Looking at the positive side of this result, it does suggest that larger companies are not using

their higher bargaining power to ensure they obtain higher benefits from the collaboration to the detriment of the smaller company.

5.5 Formality of Horizontal Collaboration

A further question that had been included in the follow-up questionnaire came from a discussion with a practitioner in the logistics industry who had responded to the questionnaire, about this particular respondents company's horizontal collaboration practices. The respondent indicated that the horizontal collaboration undertaken by the company in question is all done on a very informal basis with no written agreements in place, which was why, when completing the questionnaire, the respondent had left a number of questions blank.

To explore this further, a question was added to the follow-up to find out whether horizontal collaboration is usually undertaken as a formal or informal partnership by companies in the logistics industry. The results for this question showed that horizontal collaboration is mainly undertaken on an informal basis in the logistics industry with 73.1% of respondents indicating that they do not have formal contracts in place for the horizontal collaboration partnerships they are involved in. In a turbulent environment such as the logistics industry, where demand is irregular and takeovers and buyouts occur regularly, this lack of formalisation makes it easier for companies to change their collaboration behaviour to best suit their demand pattern and allow them to work with the most appropriate partners at all times. This is perhaps why joint ventures are less popular in the logistics industry as they do require formal contracts.

Further analysis of this question was undertaken to explore whether the use of formal contracts has any affect on the benefit and cost sharing models. If the collaboration is formally drawn up, does this mean that the companies have more time and space to ensure

that the collaboration is mutually beneficial and does this then lead to more equal benefit and cost sharing models?

	Formal contracts in place	No formal contracts in place
Costs shared equally	55.6%	30.2%
Costs not shared equally	54.4%	68.8%
Benefits shared equally	38.2%	10.9%
Benefits not shared equally	61.8%	89.1%

Table 5.6: The relationship between formal contracts and cost and benefit sharing

Table 5.6 illustrates that horizontal collaboration partnerships with formal contracts are significantly more likely to share costs equally with 55.6% of respondents who indicated that their horizontal collaboration partnerships were governed by formal contracts indicating equal cost sharing compared to 30.2% of those with no formal contracts in place. Likewise, 38.2% of companies with formal contracts in place were sharing the benefits of the collaboration equally compared to only 10.9% of companies with no formal contracts in place. Although a significant percentage of companies with formal contracts in place were still not sharing benefits and costs equally, it can be concluded that horizontal partnerships with formal contracts in place are more likely to be equal in their cost and benefit sharing.

To further investigate the use of formal contracts and to validate assumptions about the relative formality of the types of collaboration, the percentages of respondents indicating they had formal contracts in place was investigated for each type of collaboration, as shown in Table 5.7.

Type of collaboration	With formal contracts	Without formal contracts
Consolidation of complementary freight	22.2%	77.8%
Consolidation of non complementary freight	25.0%	75.0%
Shared services	28.8%	71.2%
Joint procurement	33.3%	66.6%
Joint ventures	72.7%	27.3%

Table 5.7: Type of collaboration by formality of collaboration

It can be seen from Table 5.7, that as predicted, joint ventures are the most likely type of horizontal collaboration to be undertaken with formal contracts in place. However, despite the formality of this type of collaboration around one quarter of companies involved in joint ventures do not typically have formal contracts for horizontal collaboration. This lower than expected percentage with formal contracts, will have been influenced by companies' involvement in multiple types of collaboration.

This is due to the fact that these require the creation of a new company. Joint procurement and shared services which involve collaboration in back office processes also show higher levels of formal commitment than freight consolidation, which is the most straight forward type of collaboration to undertake on an ad-hoc basis and due to highly variable amounts of cargo and destinations it is likely to be done depending on the partner's capacity levels.

Consolidation of non-complementary freight is slightly more likely to be undertaken with formal contracts in place. This can easily be explained by the extra planning time and resources needed to be committed to the collaboration due to the added complexity of the collaboration, which may make companies more inclined to want specific agreements drawn up before the collaboration starts.

5.6 Maturity of Horizontal Collaboration Practices

As discussed in the previous section, due to the high number of respondents that had indicated that their company had been involved in horizontal collaboration for over five years, a quantification of the exact number of years was asked for in the follow-up questionnaire. This question was only included in the versions sent to respondents who had indicated that their company had been collaborating for over 5 years. The majority of the respondents indicated that they had been collaborating for under 15 years, with three respondents indicating that their company had been involved in horizontal collaboration for over forty years.

To consider the full distribution of responses to this question over both questionnaires, the distribution of the responses provided in the follow-up questionnaire have been scaled up as only 53% of the respondents that indicated they had been collaborating for over 5 years in the initial questionnaire responded to the follow-up questionnaire. Table 5.8 assumes that the responses that were gained from the follow-up questionnaire were representative of the entire 49.1% of respondents who indicated that they had been collaborating over five years and the percentages from the follow-up questionnaire have been inflated in accordance with this assumption.

Length of time involved in horizontal collaboration	Percentage of respondents
Under 1 year	11.6%
1-2 years	17.9%
3-5 years	21.4%
6-10 years	22.9%
11-15 years	10.9%
16-20 years	5.5%
21-30 years	6.5%
31-40 years	3.3%

Table 5.8: Maturity of horizontal collaboration

Table 5.8 illustrates that the modal categories were 3-5 years and 6-10 years indicating that horizontal collaboration has been common in the logistics industry for over 10 years. Moreover, around a quarter of respondents indicated an involvement in horizontal collaboration for over ten years.

To further analyse the data, the number of types of horizontal collaboration and the exact types of horizontal collaboration companies were undertaking were analysed by number of years the company had been involved in horizontal collaboration. For the purpose of this analysis, to make the percentages significant, the groups, 11-15 years and 16-20 years were combined as were the 21-30 years and 31-40 years' groups.

In terms of the average number of types of horizontal collaboration the companies in each size group are involved in, no significant difference or pattern was seen between the groups. With companies involved in horizontal collaboration for 6-10 years returning the highest average at 1.85 followed by the companies that have been involved in horizontal collaboration for under 1 years at 1.81. Companies involved in horizontal collaboration for 11-20 years returned the lowest average at 1.45. Table 5.9 indicates the percentage of companies in each time group involved in each type of collaboration.

	Consolidation of complementary freight	Consolidation of non- complementary freight	Shared services	Joint procurement	Joint ventures
Under 1 year	42.9%	23.8%	61.9%	19.0%	33.3%
1-2 years	42.9%	14.3%	71.4%	14.2%	17.8%
3-5 years	58.8%	26.5%	61.7%	14.7%	14.7%
6-10 years	60.0%	40.0%	55.0%	25.0%	5.0%
11-20 years	72.7%	0.0%	54.5%	0.0%	18.1%
21-40 years	55.6%	11.2%	66.7%	11.1%	33.3%

Table 5.9: Type of collaboration by length of time involved in horizontal collaboration

Generally the length of time companies have been involved in horizontal collaboration does not seem to have a significant effect on the type of collaboration in which the companies are involved. The type of collaboration that appears to be the exception to this rule is the consolidation of complementary freight, where up to the 21-40 years' group, the percentage of companies involved in consolidation of complementary freight increases with the number of years the company has been involved in collaboration.

The final analysis which was undertaken with these new size categories was a repeat of the kruskal-wallis test investigating the impact of length of time collaborating on perceived effectiveness of the horizontal collaboration; this returned the same result as the previous test, with the null hypothesis being retained at 0.465.

5.7 Size of Types of Horizontal Collaboration Partnerships

Analysis undertaken on the initial questionnaire results had shown a potential difference in the average number of partners involved in each initiative, with consolidation of complementary freight and shared services having an average of 2-3 partners, whilst the consolidation of non-complementary freight had an average of more than six partners. Joint procurement and joint ventures showed equal numbers across two groups. Table 5.10 shows

the percentage of companies involved in each type of collaboration by the number of partners.

Number of partners	Consolidation of complementary freight	Consolidation of non-complementary freight	Shared services	Joint procurement	Joint ventures
1-5	56.4%	58.3%	71.6%	100%	86.7%
6-10	15.4%	25.0%	16.9%	0.0%	6.7%
11-20	2.6%	16.7%	3.8%	0.0%	6.7%
21-30	12.8%	0.0%	3.8%	0.0%	0.0%
31-40	0.0%	0.0%	0.0%	0.0%	0.0%
41-50	0.0%	0.0%	0.0%	0.0%	0.0%
51 or over	12.8%	0.0%	3.8%	0.0%	0.0%

Table 5.10: Type of collaboration by number of partners

It can be seen from Table 5.10 that the two types of consolidation of freight are more likely to be undertaken with a larger number of partners than the other forms of collaboration. This could be due to the added advantages of undertaking this type of collaboration with multiple partners. Companies can use consolidation of freight to significantly increase their geographical service range and may need a different partner for each area. After a certain number of partners in shared services, joint procurement and joint ventures, additional partners are unlikely to bring any further benefits to the collaboration.

Joint ventures are likely to be undertaken with a smaller number of partners due to the high complexity and formality of these types of collaboration. It appears that joint procurement is generally undertaken with less than six partners, which again might be due to the added complexity of amalgamating additional orders and the addition of more partners not bringing any further bargaining power or discounts.

A further kruskal-wallis test was undertaken to ascertain if the difference in number of partners between the types of collaboration was statistically relevant. This concluded that the null hypothesis should be retained with a value of 0.588.

The next relationship that was investigated was the relationship between the number of years the company had been involved in collaboration and the number of partners.

Number of years involved in horizontal collaboration	Average number of partners
Under 1 year	2.13
1-2 years	6.21
3-5 years	5.76
6-10 years	8.67
11-20 years	18.13
21-40 years	14.42

Table 5.11: Number of partners by length of involvement in horizontal collaboration

Table 5.11 shows a generally positive trend in number of partners as the length of time involved in horizontal collaboration increases, with a slight drop at the 3-5 years' mark and at the 21-40 years' mark. This shows that once companies become involved in horizontal collaboration they tend to increase their number of partners. This ties in with the idea that once a company can prove a level of competency in horizontal collaboration it becomes more attractive as a partner to other companies. It also suggests that companies can see additional gains in expanding their horizontal collaboration practices to include extra partners.

A kruskal-wallis test performed on this data rejected the null hypothesis with a significance of 0.00. Further statistical testing was undertaken in the form of Mann-Whitney U tests to establish where the differences were seen. A summary of these tests is shown in Tables 12-16.

Variables	Mean Rank	Sum of Ranks	Significance
Under 1 year	20.84	396	0.049
1-2 years	29.06	930	
Under 1 year	18.79	357	0.013
3-5 years	28.93	868	
Under 1 year	16.50	313.5	0.003
6-10 years	27.75	721.5	
Under 1 year	13.79	262	0.019
11-20 years	21.36	299	
Under 1 year	10.84	206	0.000
21 years or over	25.93	389	

Table 5.12: Mann-Whitney U tests undertaken on the under 1 years' group

Variables	Mean Rank	Sum of Ranks	Significance
1-2 years	29.39	940.5	0.335
3-5 years	33.75	1012.5	
1-2 years	25.69	822	0.054
6-10 years	34.19	889	
1-2 years	21.94	702	0.227
11-20 years	27.07	379	
1-2 years	18.36	587.5	0.000
21 years or over	36.03	540.5	

Table 5.13: Mann-Whitney U tests undertaken on the 1-2 years' group

Variables	Mean Rank	Sum of Ranks	Significance
3-5 years	26.22	786.5	0.256
6-10 years	31.13	809.5	
3-5 years	21.18	635.5	0.315
11-20 years	25.32	354.5	
3-5 years	18.03	541	0.000
21 years or over	32.93	494	

Table 5.14: Mann-Whitney U tests undertaken on the 3-5 years' group

Variables	Mean Rank	Sum of Ranks	Significance
6-10 years	19.48	506.5	0.448
11-20 years	22.39	313.5	
6-10 years	17.21	447.5	0.007
21 years or over	27.57	413.5	

Table 5.15: Mann-Whitney U tests undertaken on the 6-10 years' group

Variables	Mean Rank	Sum of Ranks	Significance
11-20 years	13.79	193	0.477
21 years or over	16.13	242	

Table 5.16: Mann-Whitney U tests undertaken on the 21 years' or over group

Table 5.12 shows that a significant difference was seen at the 0.05 level between the number of partners companies that have been collaborating under one year have compared to every other group, with the exception of the companies that have been collaborating for one to two years. This suggests that after an involvement in horizontal collaboration for two years, companies start to significantly grow the number of partners they are collaborating with.

Moreover, the one to two years' group does not show a significant difference the groups until it is compared with the companies that have been collaborating for 21 years or over. This suggests that it is during the one to two year period that companies start to significantly expand the number of companies they are collaborating with but then the increase in the number of partners only increases by a small amount until the company has been collaborating for 21 years or more. This is supported by Tables 13 and 14 which only show a significant difference between the 3-5 years' group and the 6-10 years' group when they are compared to the 20 years' group.

Table 5.16 does, however, show a slight difference to this theory as there is no significant difference between the 11-20 years' group and the 21 years and over group. This suggests that the number of partners tends to start increasing considerably again within the 11-20 year period but does not increase significantly enough to show a significant difference with the lower time periods.

5.8 Future of Horizontal Collaboration

In the follow-up questionnaire, respondents were asked how they believed their company's involvement in horizontal collaboration would change over the next five years. The responses to this question are shown in Table 5.17.

Type of collaboration	Percentage of respondents
Stay the same	28.9
Increase number of partners	57.8
Increase level of collaboration	37.8
Decrease number of partners	2.2
Decrease level of collaboration	2.2
Cease collaborating	2.2

Table 5.17: Future of horizontal collaboration

It can be seen from Table 5.17 that the majority of respondents felt that their company's involvement in horizontal collaboration would grow, mainly in the form of increasing the number of partners that the company collaborates with, although a significant percentage did indicate that they would increase the level of collaboration with their existing partners. Only a very small percentage of respondents indicated that they believed their company's involvement in horizontal collaboration would reduce in any way. This shows that the intensity of horizontal collaboration in the logistics industry is likely to increase in the next 5 years.

Two potential sets of underlying factors of these results were investigated, the number of horizontal collaboration partners the company already has and the type of collaboration. The break down by number of partners is shown in Table 5.18.

	Stay the same	Increase number of partners	Increase level of collaboration	Decrease number of partners	Decrease level of collaboration	Cease collaborating
Consolidation of complementary freight	25.6%	62.8%	44.2%	2.3%	0.0%	0.0%
Consolidation of non- complementary freight	12.5%	87.5%	50.0%	0.0%	0.0%	0.0%
Shared services	32.7%	52.7%	38.2%	1.8%	1.8%	3.6%
Joint procurement	28.6%	64.3%	35.7%	0.0%	0.0%	0.0%
Joint ventures	33.3%	60.0%	26.7%	6.7%	6.7%	0.0%

Table 5.18: Future of horizontal collaboration by type of collaboration

It can be seen that despite the high effectiveness rating that was given to joint ventures, companies involved in joint ventures are the most likely to decrease their level of collaboration over the next five years or keep the same level of horizontal collaboration. This could be because these respondents are of the opinion that the company has gotten all it needs from horizontal collaboration and are in a position to discontinue the practice or just keep it at the same level to retain the benefits it is already receiving from it. Alternatively this could simply be because a joint venture is coming to a planned end in the next five years and no new collaboration has been set in place yet.

Companies involved in consolidation of non-complementary freight are the most likely to increase both the number of partners they are working with and the level of collaboration.

Given that two of the responses to this question related to changes in number of partners, further analysis of the responses to this question was undertaken with regards to the number of partners the respondent had indicated that the company already had.

	Stay the same	Increase number of partners	Increase level of collaboration	Decrease number of partners	Decrease level of collaboration	Cease collaborating
1-5	26.9%	51.9%	32.7%	3.8%	3.8%	3.8%
6-10	30.7%	61.5%	15.4%	0	0	0
11-25	16.7%	83.4%	66.7%	0	0	0
25+	28.6%	57.1%	71.4%	0	0	0

Table 5.19: Future of collaboration by number of partners

Table 5.19 shows that even the companies with the highest number of partners believe that they will increase the number of partners they are collaborating with over the next five years. However, the companies with the most partners did show a lower percentage that believed they would increase the number of partners they are working with. Although the companies

with the least number of partners were the least likely to believe they would increase the number of partners and were also the only category to indicate they believed a decrease in number of partners or level of collaboration was likely or that they would cease collaborating. This suggests that there is a minimum number of partners needed to see enough benefits from horizontal collaboration or for the benefits to balance out the time and resources needed to establish the collaboration, to make growing horizontal collaboration of strategic benefit to the collaboration.

Neither the responses to staying the same nor the responses to ‘increase the level of collaboration’ showed a pattern in terms of number of partners, although ‘increasing the level of collaboration’ was more popular with the 11-25 and 25+ categories.

The final factor that was considered was the number of initiatives the respondents had indicated in which they were involved in. This is shown in Table 5.20.

	Stay the same	Increase number of partners	Increase level of collaboration	Decrease number of partners	Decrease level of collaboration	Cease collaborating
1	33.3%	51.1%	33.3%	2.2%	2.2%	4.4%
2	27.2%	54.5%	31.8%	0	0	0
3	21.4%	78.6%	57.1%	0	0	0
4	20.3%	66.6%	33.3%	0	0	0

Table 5.20: Future of collaboration by number of initiatives

As with the previous factor, companies showing the lowest level of involvement in horizontal collaboration are most likely to believe that their companies’ horizontal collaboration practices will decrease or cease over the next five years. Companies involved in higher numbers of types of collaboration are most likely to indicate they believe their number of

partners will increase, whilst, the increase in level of collaboration shows no relationship to the number of initiatives in which the company is involved.

5.9 Chapter Summary

This chapter has presented the results from the follow-up questionnaire. The main findings from this are summarised below.

- Joint ventures were seen to be perceived as the most effective type of collaboration, whilst ‘warehouses belonging to the respondent’s company’ was seen as the most effective type of resource sharing.
- The perceived effectiveness of horizontal collaboration is most significantly affected by the relative size of the partners, with companies indicating that collaborating with larger companies is more beneficial than collaborating with smaller companies. This is thought to be due to the higher level of resources this gives the respondent company access to and due to the extra knowledge spill-over or learning that can be gained from a larger company.
- 71% of companies do not have formal contracts in place for their horizontal collaboration partnerships, with consolidation of complementary freight being least likely to be governed by formal contracts and joint ventures being the most likely to be governed by formal contracts. This was as expected with consolidation of complementary freight being the most informal type of collaboration and joint ventures being the most formal type of collaboration
- The modal categories for the length of time companies have been involved in horizontal collaboration were 3-5 years and 6-10 years, with 3.3% indicating they had been collaborating for 31-40 years, showing that horizontal collaboration has been a common practice in the logistics industry for a considerable length of time.

- Consolidation of complementary freight is likely to be undertaken with a high number of partners, whereas the majority of shared services, joint procurement and joint venture projects have less than ten partners.
- There is a significant positive relationship between the number of years a company has been involved in horizontal collaboration and the number of partners it has.
- Generally, respondents felt that their companies' involvement in horizontal collaboration would grow both in terms of number of partners and in the scope of their relationships with existing partners over the next five years.
- Despite the high perceived effectiveness of joint ventures, companies involved in joint ventures are the most likely to believe their involvement in horizontal collaboration will decrease over the next five years, which is thought to be due to the planned end of collaborations or because respondents feel their company has gained all it can from horizontal collaboration.
- Companies with five or less partners are most likely to believe their involvement in horizontal collaboration will decrease, suggesting that with less than 5 partners companies do not gain enough benefits from horizontal collaboration to feel that it is a strategy worth pursuing to a wider/any extent in the future.

CHAPTER 6

CASE STUDIES

6.1 Chapter Introduction

This chapter presents the information gathered from the seven case studies that were undertaken. As discussed in the methodology, this research aims to undertake two case studies for each of the four types of horizontal collaboration commonly undertaken in the logistics industry. However, only one joint procurement case was found.

The case studies were undertaken through a number of steps. The standard case study protocol was as follows.

- 1) A potential case study was identified from the responses to the questionnaires.
- 2) The respondent was contacted by e-mail and/or phone to request a meeting.
- 3) Information about the company that was in the public domain was collated.
- 4) First interview with the respondent was undertaken.
- 5) Data from the first interview with any further secondary information given by the respondent or found through internet and news searches was analysed.
- 6) Further questions and gaps in the information were identified.
- 7) A second interview was undertaken or the further questions were e-mailed to the respondent.
- 8) Further responses were analysed.

Respondents were asked questions according to a semi-structured questions list shown in the appendix. These questions were split into a number of categories, general horizontal collaboration behaviour, implementation of horizontal collaboration, performance enhancements and the future of horizontal collaboration at the company. The performance enhancements section was split into four categories, cost, efficiency, customer service and

flexibility. These four categories covered the drivers for collaboration that were used in the questionnaire, as shown in Table 6.1.

Costs	Efficiency	Customer service	Flexibility
Reduce transport costs	Increase vehicle fill utilisation	Access new markets	Allow for easier response to demand
Reduce procurement costs	Reduce carbon emissions	Enhance customer service	
Reduce storage costs			
Reduce administrative costs			

Table 6.1 Driver categories

The cases particularly focused on the performance enhancements gained through horizontal collaboration and the differences in performance enhancements gained through each type of collaboration. This focus was used as the literature identified that little research had been undertaken to compare the different types of horizontal collaboration and that there was a lack of case data illustrating the benefits of horizontal collaboration.

The cases are presented in the order of the types of horizontal collaboration as described in the literature review and used in the two questionnaires, with cases one and two being on freight consolidation, three and four on shared services, five and six on joint ventures and seven on joint procurement. A brief overview of the cases is given in Table 6.2.

Case	Type of horizontal collaboration	Focal company	Partners	Motivation
1	Freight consolidation	Company A – large multinational parcel company	Partner A1 - large multinational parcel company	Cost reduction whilst improving service level.
2	Freight consolidation	Company B – small British freight forwarder	Partner B1 – German freight forwarder	Maintaining service levels on a reduced volume route whilst cutting costs.
3	Shared services	Company A – large multinational parcel company	Partner A2 – large airline with a considerable focus on air freight	Increased fill rates on a low volume utilisation route.
4	Shared services	Company C – small British freight forwarder	Partner C1 – small Spanish freight forwarder	Cost and empty running miles reduction.
5	Joint venture	Company A – large multinational parcel company	Post Office in country A1	Entrance to new market.
6	Joint venture	Joint Venture Company D – automotive warehouse and sequencing facility	Logistics companies D1, D2, D3 and D4	Increased services to an existing customer.
7	Joint procurement	Company E – medium sized British 4 th party logistics company	Facilitating collaboration of its customers	Cost reduction for a customer consortium.

Table 6.2: Overview of the cases undertaken

Whilst undertaking the cases studies, a difference was observed in what the term ‘shared services’ had initially been used to mean in the questionnaire and what it is used to mean in

logistics collaborations. In logistics, shared services collaborations, rather than referring to the sharing of back office resources, are used to indicate the sharing of a particular route and its associated planning and implementation. For example, case four discusses a code sharing and flight sharing service, which is a much more formal and complex collaboration than the freight consolidation examples. This justifies the separation of the two sets of cases.

6.2 Case Study 1

This case study concerns a freight consolidation partnership between company A, the focal company and Partner Company A1, which company A competes with directly in a number of markets.

This case was undertaken through the steps illustrated in the case study protocol, in this case three interviews were carried out with one respondent, however, the respondent did acquire data for the case from other people within the company through a series of e-mails.

6.2.1 Introduction to Company A

Company A is a global express logistics company, which focuses on delivering parcels and documents around the world to meet its customers' requirements. It specialises in day specific and time specific pickup and delivery. Company A is a global corporation that aims to meet customer requirements globally through a network of partners.

Company A offers a range of services to its customers in terms of transportation methods and lead times. Company A also offer value-added services such as re-packaging aimed at certain industrial sectors. A brief overview of Company A is shown in Table 6.3.

Countries with own operations	63
Countries served	200+
Employees	83,235
Vehicles	30.239
Aircraft	50
Depots/hubs	2653
Express total tonnes carried	8,207,603

Table 6.3: Company A in numbers (Company A 2011a)

Table 6.3 illustrates that despite only owning its own operational facilities in 63 countries, Company A manages to serve 200+ countries. This is due to its strong culture for involvement in horizontal collaboration and subcontracting. Company A has expanded into markets such as Africa by sub-contracting its operations to local firms. As the level of business to these areas is not yet high enough to warrant its own operations its expansion into the Asian markets has been undertaken through subcontracting and through the buying out of Logistics firms, although this has proved problematic as very few Asian logistics firms have express capabilities forcing Company A to change the focus of the company once it has been acquired. Company A also subcontracts most of the first and last mile deliveries to small and medium sized local companies in the countries where they do have a presence. Some of the subcontracting agreements in existence in countries such as Cyprus have been operating for over 20 years.

Company A currently has a 17% share of the European Express market as of 2011 (Company A 2011b). The European part of Company A's business accounts for around 62% of its total business. The other major players in the market and their relevant market shares are shown in Table 6.4. These figures are for 2009 as this was the most recent year's information available.

Company	Percentage market share
Company A	18
Partner Company A1	16
Competitor A1	9
Competitor A2	7
Competitor A3	5
Competitor A4	2
Other	43

Table 6.4: Market share (Company A's Previous holding company 2009)

It can be seen from Table 6.4 that Company A's major competitor in the European Express market is its Partner Company A1, although 43% of the market share is taken up by smaller national or regional services. Figure 6.1 compares Company A's revenue growth with that of its closest competitor, Partner Company A1 and a number of global averages.

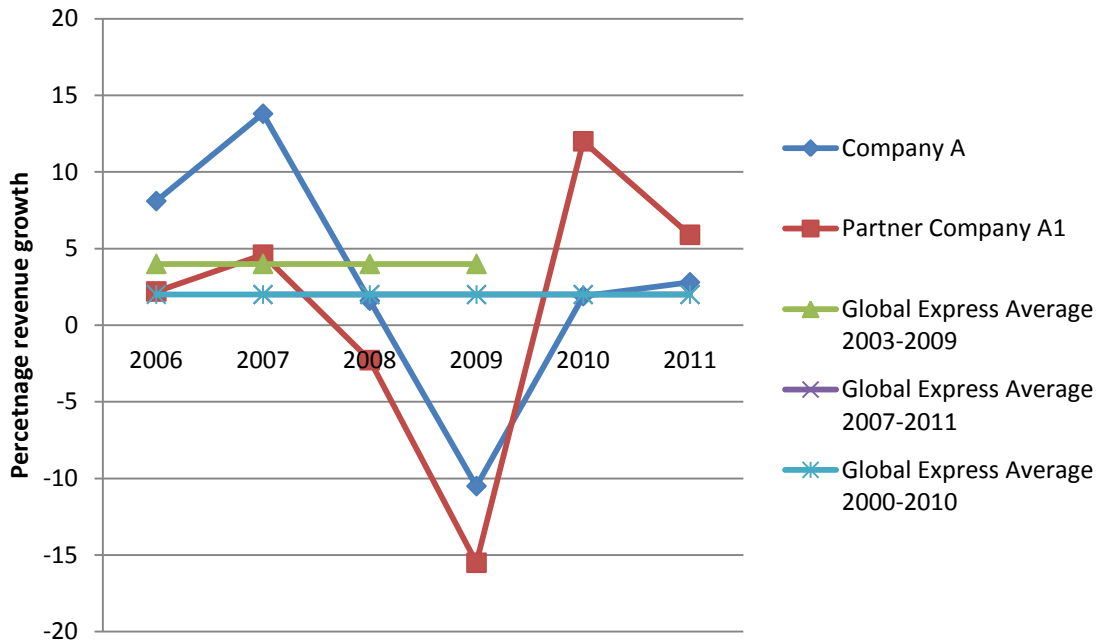


Figure 6.1: Revenue growth (data collated from Company A and Partner Company A1 annual reports and Oxford Economics (2009))

Note with regard to figure 6.1 the global express averages for 2000-2010 and 2007-2011 were at exactly the same value and therefore only the global express average 2000-2010 points and line are visible.

It can be seen from Figure 6.1 that both Company A and Partner Company A1 saw similar changes to their percentage revenue growths between 2006 and 2011. Both companies saw significant decreases in revenue growth in 2008 and 2009, corresponding with the global economic problems. Company A has seen smaller revenue increases in 2010 and 2011 than Partner Company A1; however, Company A is experiencing a revenue growth that looks more sustainable with the 2010 and 2011 figures being at similar levels. Partner Company A1 saw a much higher percentage revenue growth in 2010 but this was not sustained in 2011.

Comparing Company A's revenue growth to the averages shows that Company A has performed well against the global averages. Company A performed better than the 2003 – 2009 average in 2006 and 2007 but then during the economic crisis dropped below that level.

Similarly, when the 2000-2010 average is considered, Company A is considerably below the average in 2008 and 2009 and then rising to a similar figure in 2010 and then slightly above in 2010. Table 6.5 compares Company A's averages over the 3 periods to the global averages.

Period	Company A Average (%)	Global Average (%)
2000-2010	2.95	2
2003-2009	3.25	4
2007-2012	1.92	2

Table 6.5: Comparison of Company A and global average revenue growths

Table 6.5 shows over the ten years' period between 2000 and 2010 Company A performed better than the global averages for 2000-2010, however, over the shorter periods, particularly between 2003 and 2009 Company A's performance was under the average, although it is only just below the 2007-2012 average. This suggests that Company A is potentially not operating as efficiently or effectively as its competitors.

Whilst Company A may have seen fluctuating levels of revenue growth, its figures for tonnes of freight carried per year show a steadier pattern, with positive year on year increases being seen every year from 2002 to 2011. This is illustrated in Figure 6.2.

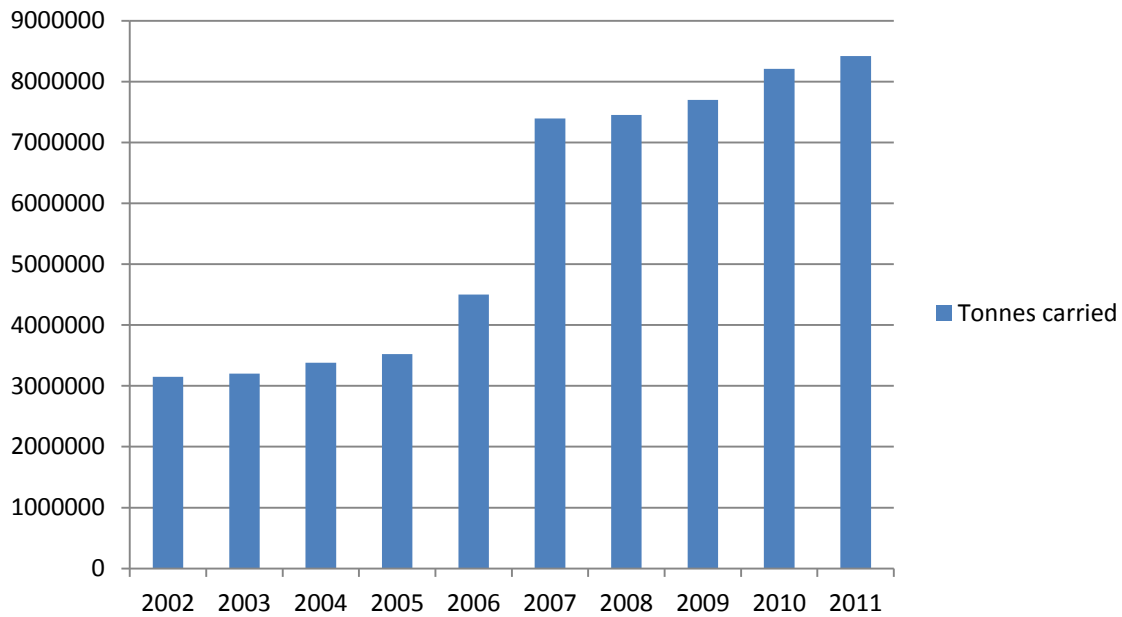


Figure 6.2: Tonnes carried per year (data collated from Company A’s Annual reports)

The growth in tonnes carried is seen to slow down in 2008 and 2009, in-line with the revenue drops but has still shown increases every year. This coupled with the more fluctuating revenue suggests that in the economic crises companies continued using Express services but used the cheaper services that did not generate as much revenue for Company A.

Company A offers a number of different services to the customer based on price and delivery speed. Services differ slightly by country in terms of coverage, speed and price but follow similar models. The parcel delivery services offered in the UK are shown in Table 6.6.

Service Category	Service
National	9am – delivery by 9am the following day 10am – delivery by 10am the following day 12a, – delivery by 12am the following day Express – delivery by close of business the following day Same day – urgent service offered 24 hours a day, 365 days a year
Saturday Services	Saturday morning collection for Monday delivery service Saturday delivery for consignments collected on Friday Monday delivery for consignments collected on Saturday
Day Specific	12am Express – delivery before 12 the following day to major cities and business zones in 25 European countries Express – delivery before the end of business the following day (dependent on location) to 200 countries
Economy Express	Delivery in 2-5 working days to 200 countries

Table 6.6: Company A parcel delivery services (Company A Holdings 2011)

Table 6.6 shows that Company A offers a number of services, to cover different urgencies and locations. Figure 6.3 shows examples of the comparison of the coverage of two of these services.



Figure 6.3: Service coverage (Company A 2010a)

It can be seen from Figure 6.3 that although a large percentage of the UK is covered by the 9am Express service, Company A's, fastest national service, considerable parts of Wales, Scotland and Southern England as well as Northern Island are excluded from this service. The Express service shows a fuller coverage although next day services do appear to exclude parts of northern Scotland.

Company A's services for delivery outside of the UK also differ by geographical area, with the transits times and services offered. Table 6.7 shows the services offered and the corresponding transit times.

Geographical Area	Express Delivery Time (days)	Economy Express Delivery Time (days)
Near EU	1	2
Far EU	1-2	2-5
European Islands	1-3	2-5
Rest of Europe	1-5	2-9
China/SE Asia	2-8	4-9
Rest of World	1-7	2-9

Table 6.7: Services offered and transit times (Company A 2010a)

Table 6.7 shows that generally the lead time increases in both time and variability the further the country is from the UK. For the majority of countries, Company A can provide the lead time in an exact number of days for both the express and the economy express services meaning the variability in times shown in Table 6.7 refers to differences in lead times between the countries in each area. For example in the Far EU area all countries except Andorra have a 1 day express lead time, which has a 2 day lead time and all countries except Bulgaria have a 4 or less day lead time for economy express.

In terms of services to rest of the world, Company A's shortest lead times are for deliveries to Bahrain, Canada, Israel, South Africa, UAE and USA. With the exception of Bahrain all of these appear in the lists of the top 50 countries that the UK exports to (HM Revenue and Customs, 2011.)

In addition to the variation in lead times to each area, the actual services offered differ. For the near EU countries all the three types of Express services and all Economy Express services are offered. In terms of the Far EU and European Islands, full services are only available to around half of the countries with 9 Express and 10 Express not available for the other half. In terms of Economy Express services, 12 Economy Express is not available for deliveries to around a quarter of the countries.

With the exception of Norway and Switzerland, which are both on the UK top 50 Export and Import list, none of the Far EU countries can be reached by all of Company A's services, with the majority only reachable by Express and Economy Express. In contrast to this, all of China/SE Asia can be reached by all services apart from 12 Express, with the exception of Laos, Myanmar, North Korea and Vietnam.

For delivery to the rest of the world 12 Economy Express is not available to any country and there are only 22 countries for which the full range of Express services are available, the majority of which appear on the UK top 50 Export and Import list. The majority of the remaining countries are only served by Express and Economy Express.

Comparing the table to the top 50 countries the UK import and export to (HM Revenue and Customs, 2011), it can be seen that 41 of the top 50 countries the UK imports and exports to are offered all the Express services and the Economy Express Service. Only 7 countries can only be reached by Express and Economy Express: Israel, Russia, Morocco, Columbia, Senegal, Algeria and Botswana, none of which appear close to the top of the top 50 list.

Transit times are still variable for the top 50 countries, with the longest Express delivery times being 3-4 days for New Zealand and Bangladesh, whilst the majority of the top countries have a 2 day or less transit time. Economy Express delivery times vary from 2 days for countries classified as near European to 5-6 days for Indonesia, Australia, New Zealand, Bangladesh, Canada, Brazil, Mexico, Russia and Botswana. The maximum delivery time is 7-9 days for Turkey.

The reasons Company A offers a higher range of services to Europe is likely to be due to it being a European company. Its focus on South East Asia is explained by Figure 6.4.

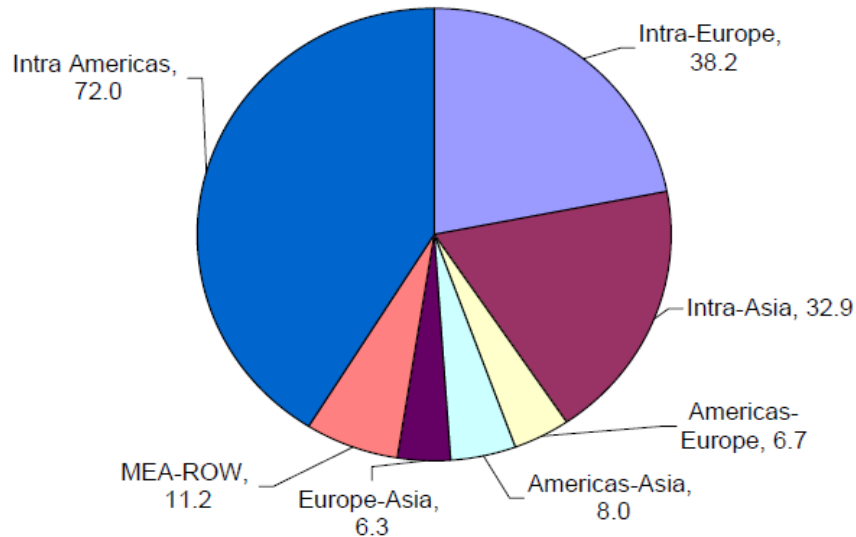


Figure 6.4: Express market shares (Oxford Economics 2009)

Figure 6.4 illustrates that the majority of Express trade generated in Europe is in the form of intra-Europe deliveries, with Europe to Asia deliveries being the only other European segment that accounts for a significant portion of the Express market. For this reason Company A has focused on offering the widest range of services to Europe and Asia

Express services transit times vary from 1 day to western European countries, to 2 days for other European destinations, key South East Asian, African and American countries, to four plus for other African nations and Islands. For many countries, delivery times can be variable due to services to that country only operating on certain days therefore the transit time is dependent on which day of the week the package/letter is sent.

6.2.2 Company A Questionnaire Responses

In the initial questionnaire responses it was indicated that Company A is collaborating with both direct and potential competitors and researching horizontal collaboration. The first two responses were common for companies of a similar size with 70% of companies with annual revenue of over 1 billion pounds indicating they were collaborating with direct competitors and 80% indicating they were collaborating with potential competitors. ‘Researching

horizontal collaboration' was a more unusual response with only 40% of respondents in the same revenue category as Company A agreeing with this statement.

Regarding the drivers of horizontal collaboration, accessing new markets, reducing transport costs, reducing procurement costs, enhancing customer service, allowing for easier response to demand fluctuation and lowering carbon emissions were all indicated to be drivers for Company A's involvement in horizontal collaboration. The only one of these responses that was unusual for a company of Company A's size is the reducing of procurement costs. It was thought in the initial questionnaire analysis that larger companies were less likely to see benefits in this area than small companies due to its high bargaining power, it appears that Company A still finds some benefits in this area despite not indicating that any of its collaborations were specifically geared towards joint purchasing.

The barriers to horizontal collaboration that were indicated in Company A's responses were fear of competitors accessing sensitive information on business operations, loss of closeness to customers, lack of common processes and systems. Limited market penetration and lack of synergies in operational practices were two additions which were made to the list by the Company A respondent. Company A's respondent did not feel that lack of trust, the top barrier identified by the questionnaire was a major barrier, although, fear of competitors accessing sensitive information is perhaps caused by a lack of trust.

It was indicated that Company A is involved in both shared services and joint ventures. Under 'other' the respondent had also indicated Company A also works with partners by way of individual shared components in the supply chain. Shared services was found to be a popular initiative with 60% of respondents indicating its company was involved in sharing services, however, joint ventures was shown to be rarer form of horizontal collaboration in the logistics industry with only 16% of respondent companies being involved in joint ventures.

It was indicated that these collaborations involve the sharing of containers, warehouses belonging to both Company A and its partners and the sharing of back office resources. Warehouses were the second most popular response whilst containers and back office resources were more unusual responses particularly the sharing of back office resources which was only being undertaken by 18% of the total respondents.

The follow up questionnaire indicated that all of the types of collaboration with the exception of sharing warehouses belonging to Company A have given moderate positive enhancements. The sharing of warehouses belonging to Company A was rated as giving no effect. This differs to the majority of responses as the average score for warehouses belonging to the respondent company was higher than the average score for warehouses belonging to another company, whereas Company A's responses suggest the opposite.

The Company A responses indicated that they are undertaking horizontal collaboration on a large scale, as they are collaborating with more than ten other companies on multiple projects. Unlike many of the other respondents, Company A's collaboration projects tend to be undertaken with one partner, rather than working with a large number of companies in one project. These projects tend to be medium to long term.

The companies that Company A collaborates with are unsurprisingly, due to its size, mainly smaller than Company A. Company A's partners are mainly located outside of the UK in Europe and the rest of the world.

Company A had been involved in horizontal collaboration projects that had been terminated. In some cases the projects ended as planned but it was also indicated that in some cases the projects were terminated due to the growth of acquisition of one of the companies involved.

The respondent from Company A indicated that in the future it is likely that the number of partners Company A is working with will increase.

6.2.3 Rationale for this Case Study

The questionnaire showed that some of the views on drivers to horizontal collaboration and horizontal collaboration involvement were affected by the size of the company. Companies such as Company A, with an annual revenue of over £1 billion only made up 5% of the respondents to the questionnaire. Company A, having indicated that it was involved in a number of types of collaboration and having a respondent who had shown significant interest in horizontal collaboration, was chosen to represent the very large companies and to provide a number of cases including a freight consolidation case which could then be contrasted with the experience of smaller companies. This case also provides an insight on horizontal collaboration within airfreight provision, an area of the logistics industry only covered by the major companies as the smaller companies utilise capacity on the major airlines and airfreight company's routes.

6.2.4 Network Structure

Company A describes its network as being an integrated air and road network, that focuses on the key trade areas in Europe, Asia, North America and South America. Company A's network includes airfreight, sea freight and road freight capacity. Company A has its own operational facilities in 62 countries; these are shown in Figure 6.5. To deliver to the other 138 countries, a network of partners and subcontractors are utilised.

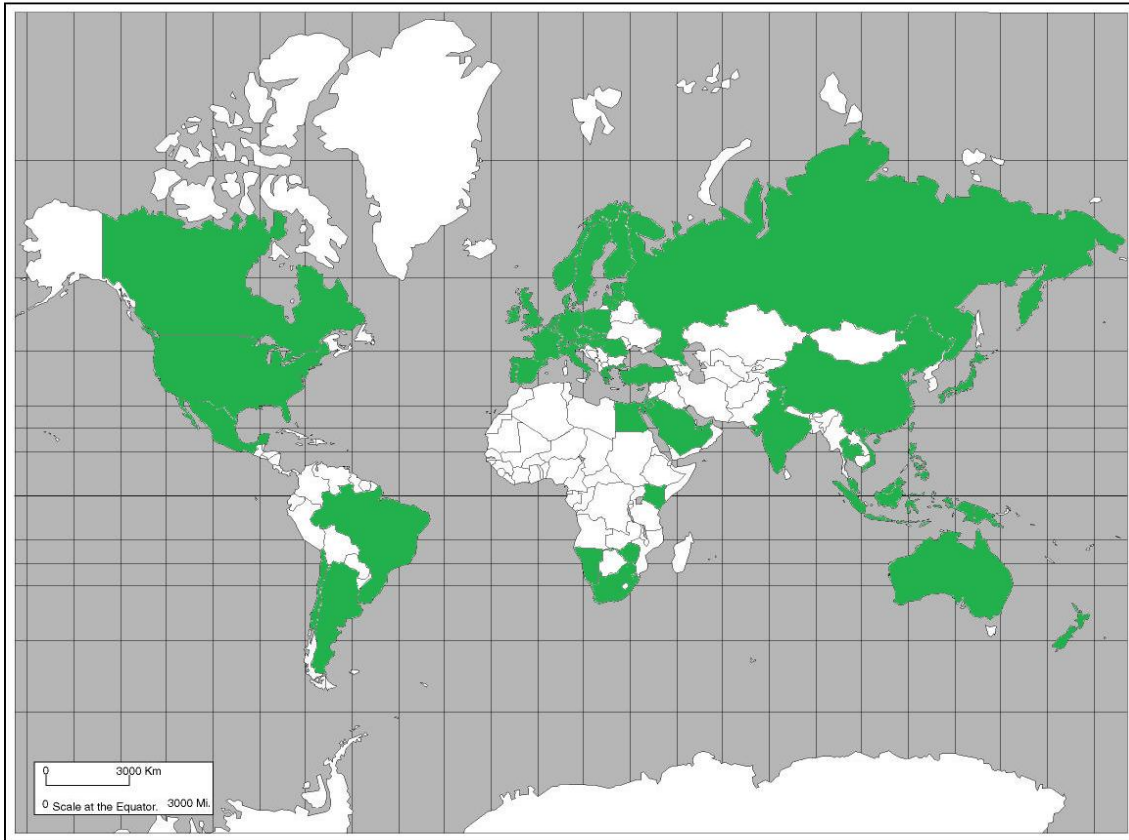


Figure 6.5: Countries in which Company A has its own operations (information collated from company A's website)

It can be seen from Figure 6.5 that through its own operations Company A manages to cover a large percentage of the main trade routes across the world. This coverage includes most of the top 50 countries the UK imports from and exports to with the exceptions being Asian countries such as South Korea and Thailand, and African nations including Algeria and Nigeria.

Company A operates 30,239 of its own vehicles which include motorcycles, vans and trucks, and a significant percentage of electric vehicles, as well as using a large number of small local subcontractors to do first mile and last mile journeys for small shipments (Company A 2011a). Company A has 20 road hubs across Europe and 2376 depots and sorting offices

worldwide to allow consolidated delivery and sorting of shipments. Outside Europe, a larger percentage of the road freight including trunk routes are outsourced to local providers.

Company A does not have its own sea freight facilities and any sea freight is delivered in collaboration with one of the shipping lines it works with. These include NYK, Cosco and Hanjin.

Figure 6.6 shows the full route a parcel from the UK would take to be delivered into a country where Company A has its own operations.

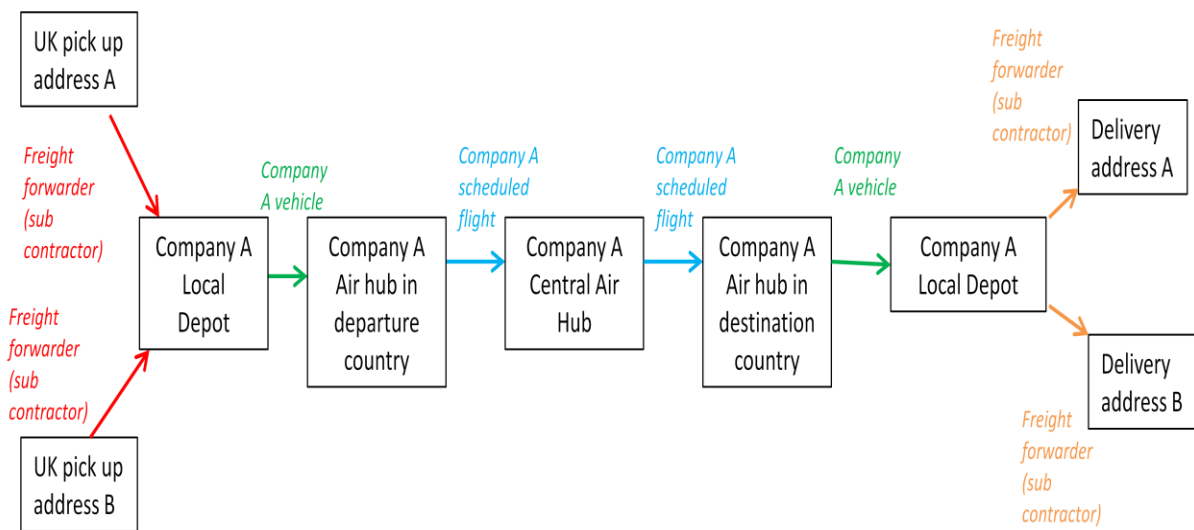


Figure 6.6: Example Company A supply chain

An example of a typical route a parcel from the UK to Europe may take would be picked up by a local subcontractor and taken to one of Company A’s hubs, from there it would be consolidated with other shipments for airfreight and taken by Company A to a UK air hub, from there it will be loaded onto a Company A aircraft and taken to the main hub in Liege from where it will be re-sorted and loaded onto another aircraft for the appropriate air hub from which it will be delivered to the appropriate local hub and then to the appropriate location by another local carrier. There are some exceptions to this route which include cases where the pick up or destination address’s local hub is the air hub at which point it will be delivered straight to/from the air hub. Although most air freight is delivered through the main

air hub at Liege, there are some popular routes that are serviced through direct flights. For example there are regular flights between the UK and Ireland.

However, Company A is currently trying to increase its road freight and decrease air freight. This may mean more shipments go through multiple road hubs rather than the air hubs. However, urgent deliveries do not go through either the air or road hubs and are delivered directly from the customer to the delivery address.

Company A also use its hubs to offer warehousing facilities and value added activities such as replenishment of products and spare parts, inbound materials management, returns and replacements management and merge-in-transit.

6.2.4.1 Introduction to Company A's Airfreight Operations

Case A and Case C both relate to Company A's airfreight operation. For this reason the airfreight network will be described in further detail.

Before considering Company A's air freight operations, a brief overview of the general air freight industry is presented. Air freight has generally seen a decrease since the economic downturn, due to its high comparative expense when compared to other modes of transport such as road and rail. The extent to which this has occurred is highlighted in Figure 6.7 which illustrates this by showing the change in airfreight handled between 2007 and 2012.

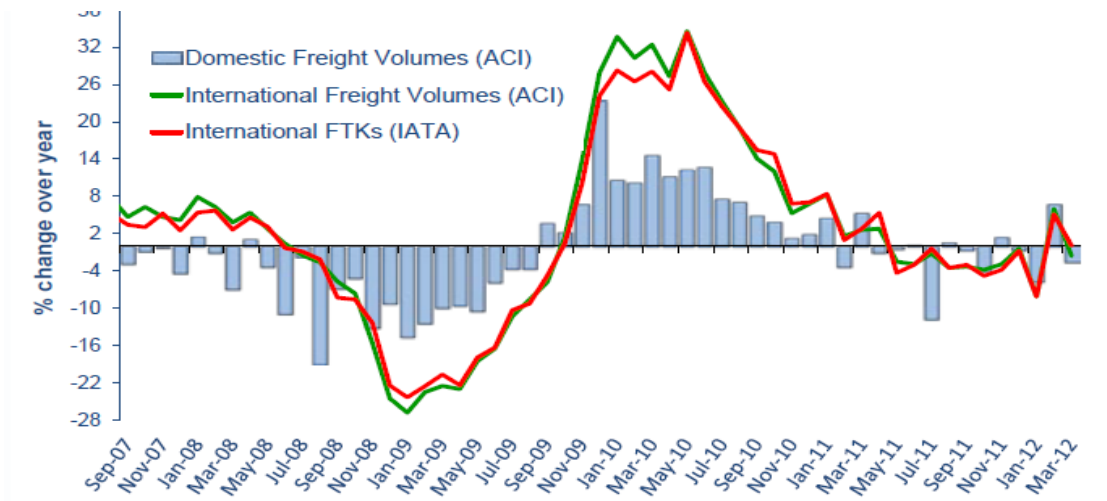
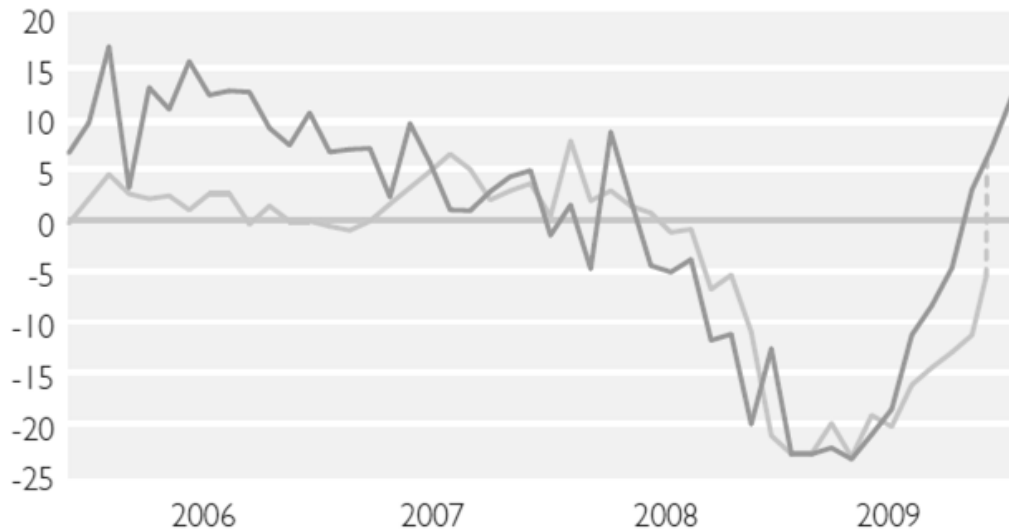


Figure 6.7: Changes in international freight volumes (IATA 2012)

Figure 6.7 illustrates the volatility of the air freight market, with 2009 seeing significant decreases in freight each month, when compared to the same month of the previous year. 2010 saw high increases but it must be remembered that these high increases are compared to the same month in the previous year not the previous month of that year, meaning the increases seen in 2010 are still small relatively small as they are being compared to decreases in the previous year. 2011 saw small decreases again with the picture so far for 2012 being mixed as January saw an increase but March saw a decrease again.

Company A's volumes shipped by air freight have been seen to follow very closely to the industry average. This is illustrated by Figure 6.8.



Darker grey line = Company A

Lighter grey line = Air Cargo Industry Europe

Figure 6.8: Comparison of Company A and general air freight volumes (kg) (Company A's previous Holding Company, 2009)

Figure 6.8 shows that Company A experienced higher growth in volumes in 2006 than was generally seen across the air cargo industry in Europe but then saw greater decreases in late 2007 to 2008. However, by mid 2009 Company A was managing to generate higher percentage increases in cargo than was generally being seen by the European cargo industry.

The dependency on air freight differs by country, whilst generally air accounts for less than 1% of the tonnage of EU trade, air freight makes up over 22% of the value of EU trade with the rest of the world (Oxford Economics 2011), with some countries delivering larger percentages of freight by air than others. Figure 6.9 gives an indication of how air cargo volumes differ across Europe.

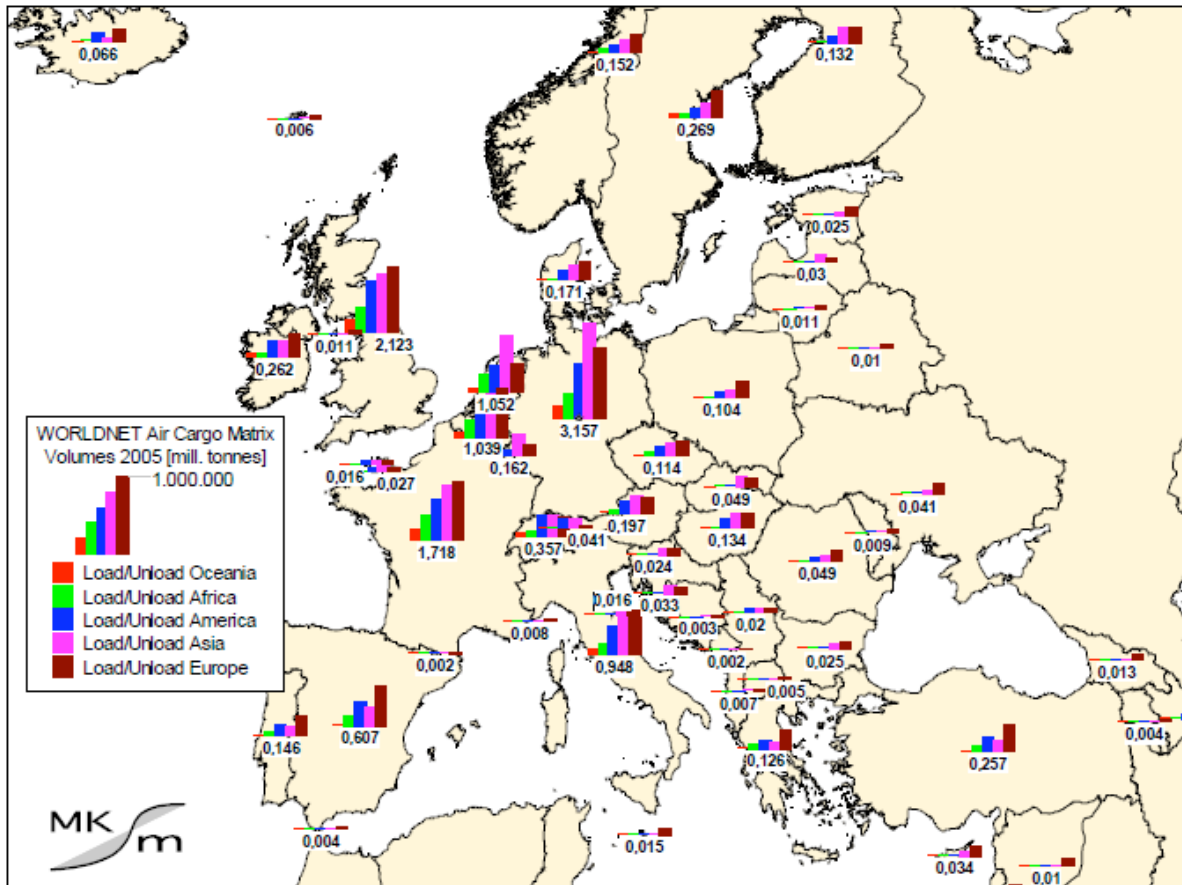


Figure 6.9: Cargo volumes by country (Worldnet 2009 from Scholz et al 2011)

The highest air cargo volumes are seen in Germany which is partially explained by the fact it is the largest exporter in Europe. Considering the European countries which are in the routes that are affected by the horizontal collaboration partnerships discussed in this research, which are the UK, Ireland and Belgium, it can be seen that the UK is responsible for the largest volumes of air cargo, with the majority of this being inter-European freight. The largest percentage of Ireland's air freight is also inter-European freight. The UK and Ireland both show high comparative reliances on air freight compared to other European countries due to the fact they are not mainland countries which means road transportation would have to involve a sea crossing in addition to increasing the cost and complexity of delivering by road and therefore making air freight a more competitive option.

Belgium shows similar levels of freight being delivered to Africa, America, Asia and Europe. This can be explained as Liege is a major European Air Freight which is not only used by Company A but also by companies such as Competitor A4 which means freight is consolidated here for delivery from all over Europe to the rest of the world and from all over the world for delivery across Europe.

Industry analysts are predicting that 2012 will see airfreight begin to increase again with many companies seeing it as a cheaper alternative to keeping large inventories of parts combined with using slower and cheaper shipping methods (Burnson 2012). Current figures suggest that this prediction may come true with the air freight market currently up 2% on Q4 of 2011 (IATA 2012).

In terms of current airfreight operations, Company A has 46 of its own 747 and 777 freight aircraft (as of 2012) plus capacity on aircraft owned by other companies including Partner Company A1 and Partner Company A2. Company A has 65 dedicated air hubs with Liege in Belgium being the central air freight hub connecting the majority of Company A's other air hubs. Company A operates 550 scheduled flights a week between these hubs. This air network allows Company A to offer quick delivery to locations worldwide. However, due to the high cost of delivering by air in comparison to by road, Company A is currently trying to cut down its air freight and utilise faster services across its road freight network for the faster services. This can be achieved through making direct deliveries and cutting out the hubs and depots that would be used in ordinary deliveries. This would potentially mean operating road journeys at lower capacities but Company A still believes this will bring savings rather than extra cost to its operations. Figure 6.10 shows how the number of aircraft Company A has been operating changed between 2007 and 2011.

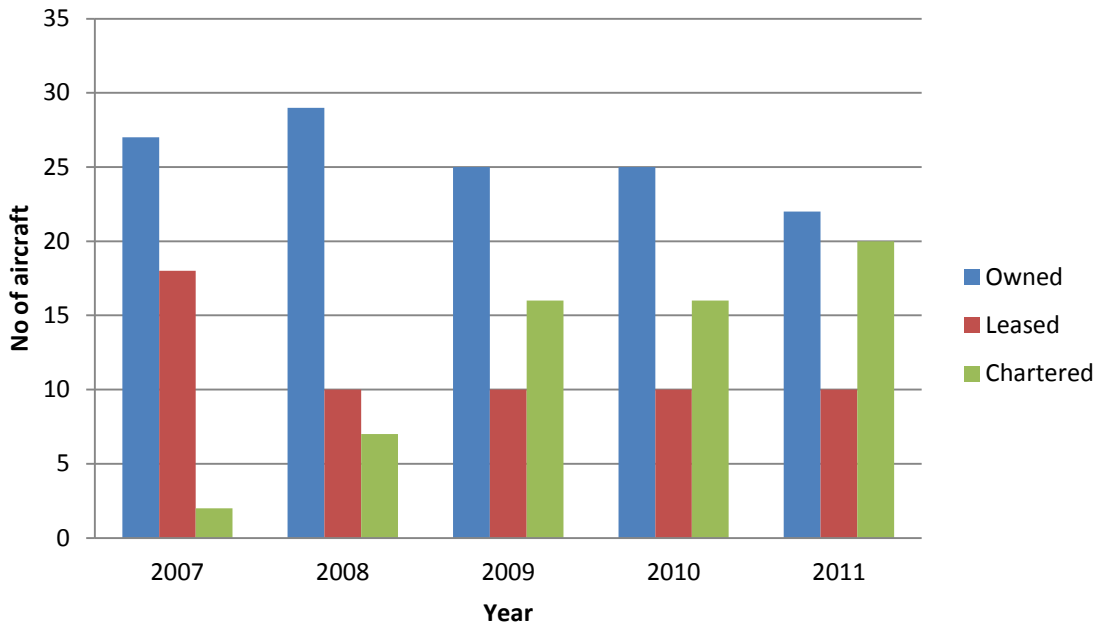


Figure 6.10: Company A aircraft numbers (consolidated from Company A annual reports)

It can be seen from Figure 6.10 that the number of aircraft fully owned by Company A has decreased over the past 5 years with the emphasis shifting to chartering aircraft at periods where demand requires them. The number of aircraft leased dropped in 2008 due to an increase in owned aircraft; however, it did not increase again when number of owned aircraft dropped again. Comparing this trend with Partner Company A1 and Competitor A1, which were shown earlier to be the other two big players in the Express market, a significant difference can be seen. Partner Company A1 increased its owned fleet by 5 aircraft in 2011 and has purchased 18 more aircraft which are currently being converted from passenger aircraft (Partner Company A1 2011). Competitor A1 also have 15 aircraft on order at the moment (Competitor A1 2011). This suggests that Company A is pursuing a different strategy to other companies in the Express market, one that appears to be supported by the general downturn in the air freight industry as shown earlier. It is possible Partner Company A1 and Competitor A1 are either expecting the market to increase again, with Partner Company A1 having seen a small increase of 0.1% in air freight volumes between 2010 and

2011 or that they are expecting smaller and/or other players to retreat from the market allowing it to increase its market share.

Figure 6.11 compares the costs Company A has experienced in terms of running its aircraft to the total property, plant and equipment costs.

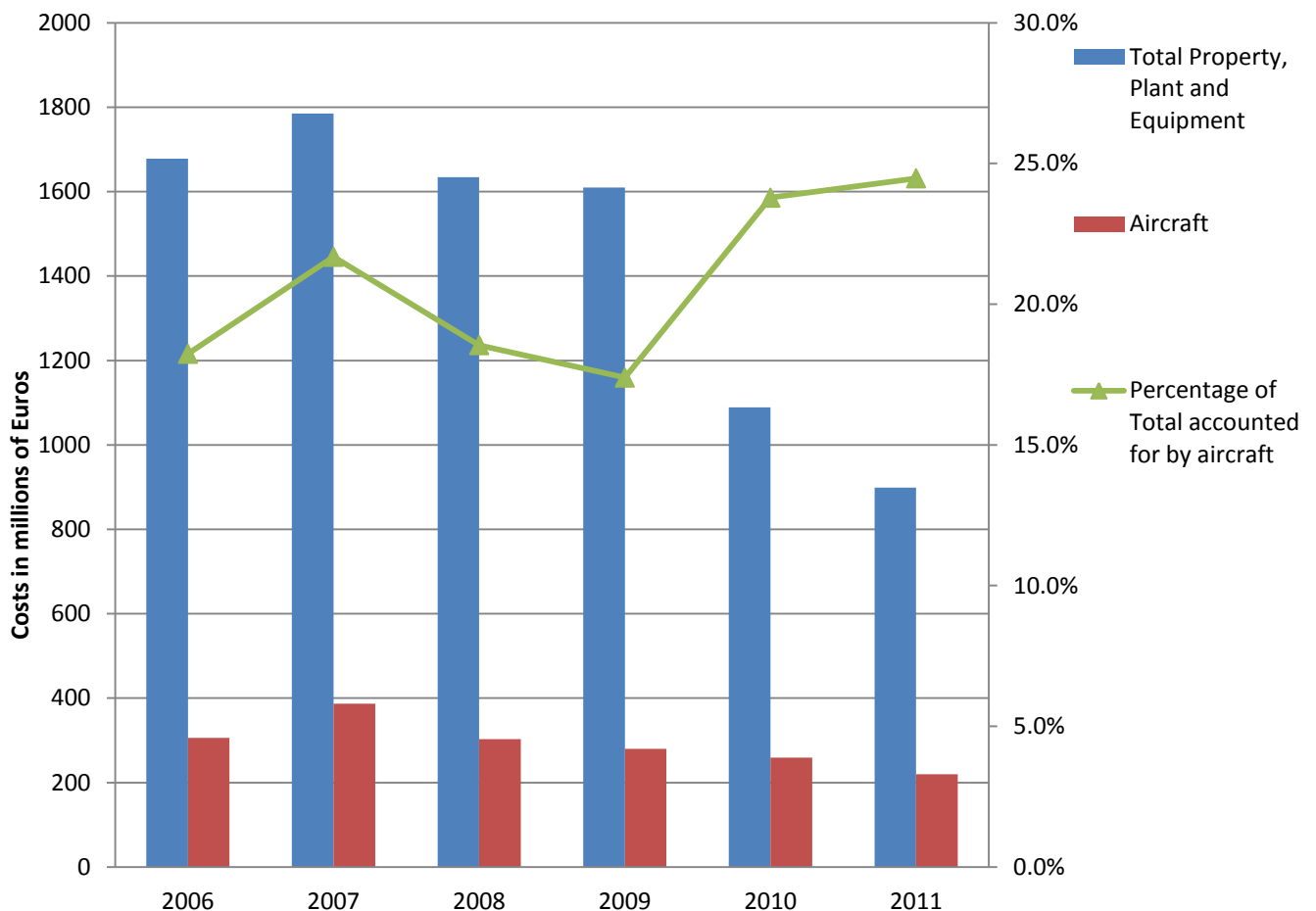


Figure 6.11: Comparison of total property, plant and equipment costs and aircraft costs (consolidated from Company A’s annual reports)

Figure 6.11 shows that aircraft costs make up a considerable percentage of Company A’s total property, plant and equipment costs, with this figure rising to a maximum of around 25% in 2011. Despite Company A’s attempts to cut costs by chartering rather than owning, costs of operating airfreight services have still risen. This does not necessarily suggest that Company A’s strategy is failing as costs of operating in the airfreight industry have risen

drastically, the major influence for this being this rise in fuel costs, which are the second largest costs involved in operating in the air freight industry (Harrington, 2006). Air freight costs in 2010 were also increased due to the eruption of the Eyjafjallajökul volcano which collectively cost flight operators across both the air cargo and air freight sectors around £130 million per day that airports were closed (BBC News, 2010). Air freight costs have also increased due to many countries having implemented extra security checks for airfreight, adding time and costs to air freight operations (Company A, 2011b).

Comparing these figures again to available competitor figures, as expected a significant difference is seen. This is shown in Table 6.8.

	Company A	Partner Company A1
2011	24.5%	39.9%
2010	23.8%	39.9%

Table 6.8: Company A/Partner Company A comparison of percentage of property, plant and equipment cost accounted for by aircraft costs (consolidated from Company A annual reports and Partner Company A1 2011)

As would be expected from the previous data, Company A's costs associated with its aircraft make up a significantly lower percentage of its overall property, plant and equipment cost. Unlike Company A, Partner Company A1 has managed to keep its percentage of aircraft costs the same. The most likely reason for this is an overall increase in costs, Partner Company A made major investments in a number of its hubs in 2011 which increased the costs generally; meaning, despite expanding its fleet, the percentage of its total costs associated with aircraft stayed the same.

Despite the evidence that Company A is trying to decrease its use of airfreight it can be concluded that with the significant drop in the overall airfreight, Company A must still be managing to offer an attractive service to its customers to keep growing its air freight

volumes, however, with rising costs this service whilst attractive to customers may not be generating significant revenues for Company A.

6.2.5 General Performance Improvement at Company A due to Horizontal Collaboration

Company A is undertaking horizontal collaboration in a number of forms, firstly through an agreement to share space on Partner A1's aircraft to Dublin, secondly through the sharing of services with Partner A2 in the terms of code-sharing and Company A giving Partner A2 the ability to block book space on Company A aircraft. Finally through a Joint Venture, Joint Venture Company A with the Post Office in Country A.

Company A places much importance on customer service and improving customer service.

Its current strategy for the Express market is shown in Figure 6.12.

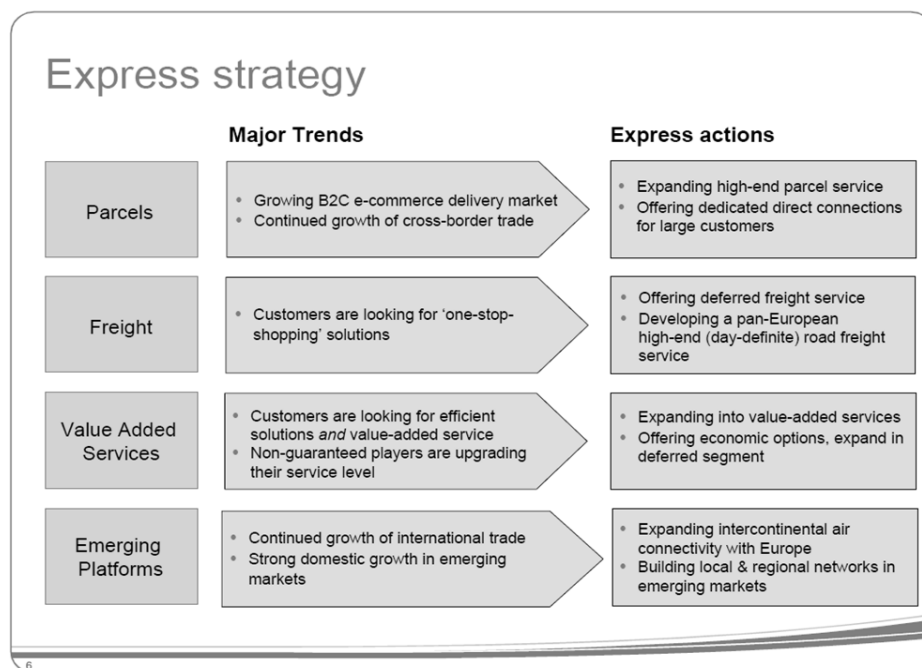


Figure 6.12: Company A Express strategy (Company A 2011a)

It can be seen that Company A is aiming to enhance its customer service in a number of ways, firstly by offering an all encompassing logistics solution which can potentially involve value-added services and by expanding the geographical range of services it can offer.

Previous research on horizontal collaboration has shown it to be a potential way for companies to both enter new markets through collaboration types such as joint ventures and freight consolidation and to allow them to offer new services through joint ventures of shared services.

Although Company A has a strong customer centric strategy, the respondent indicated that the primary aims of the horizontal collaboration projects they are involved in are to cut costs through improved efficiency and to reduce fixed capacity and exposure to volatile markets. This in turn will allow for customer service to be improved in growing markets and to be kept at current levels in decreasing markets, where perhaps services would have had to be cut otherwise. Horizontal collaboration has particularly gained significance to Company A due to economic conditions. There has been a reduction in growth of the Express market especially for airfreight, with an increase of 16.1% for road freight and 13.3% for air freight seen from 2009 to 2010 (Company A 2011b).

Another effect of the economic downturn on Company A's views towards horizontal collaboration is that expansion through the acquisition of other companies, which Company A had previously undertaken to enter new markets such as China, has become less feasible.

In terms of core processes, horizontal collaboration has been used by Company A to reduce customer lead times and to maximise efficiency by consolidating Company A's freight with competitor's freight to improve fill rates. Horizontal collaboration is thought to be a sustainable way of reducing core costs in line with pressure from customers. Potential expansions on this could be through the addition of new routes, the route considered in Case C saw expansion in 2012 and Company A's commitment to reduced fixed capacity could have been used to allow it to keep open all its existing routes. Moreover, at the time this was written Company A had been bought out by Competitor A1 which may change the strategy being undertaken in terms of air freight, as it was shown earlier in this chapter that

Competitor A1 is undertaking a different strategy in terms of air freight. Whilst Competitor A1 does not have its main hubs in the same location as Company A, it would seem likely that it will to some extent consolidate freight, which may mean external collaborations to boost fill rate are no longer so attractive.

6.2.6 Aircraft Sharing with Partner A

In 2006 Company A suspended its own small freight flights into Dublin from the UK and instead entered into an agreement with Partner A1 which allows them to use parts of Partner A1's airfreight capacity on this route. Partner Company A1 operate a once a day service from East Midlands Airport to Dublin Airport using a B777 freighter aircraft.

As was illustrated in the European air freight map shown in Figure 6.9, both the UK and Ireland are comparatively more dependent on air freight for inter-European cargo than other European countries. This means any air freight service to or from one of these countries is likely to be of high importance to Company A's service offerings.

This collaboration means that Company A delivers material to the freight depot at East Midlands, where they do all the pre-flight material checks and then hand the shipments over to Partner A1's subcontractor, which is responsible for loading the shipments onto Partner A1's aircraft. The aircraft is solely operated by Partner A1 which owns the aircraft, provides the crew and does all the related administration for the flight. The shipments are then unloaded by Partner A1's subcontractor; Partner A1's subcontractors will normally prioritise Partner A1's freight in loading and unloading. The shipments will then be transported to a Company A depot either by Company A or a Company A subcontractor.

This type of collaboration is not a completely isolated example in the air freight industry, although Partner A1 has struggled to make this type of collaboration work in other settings. In 2008, Partner A1 was in talks with Competitor A1 over a collaboration that would see

Competitor A1 provide domestic and international air freight services to the USA for Partner A1. These talks ended in 2009 with no collaboration agreement being put into place (Competitor A1 2011).

This collaboration was not the only one initiated in the express industry in 2006, 2006 also saw the beginning of a collaboration between Competitor A4 and Potential competitor A1, whereby Potential Competitor A1 delivers all freight throughout France (Potential Competitor A1, 2010a). This collaboration is still ongoing. 2006 also saw the beginning of another collaboration still in existence, this time between Competitor A1 and Potential Competitor A2 which was developed to provide international express services for international deliveries from Italy (Competitor A1, 2010).

6.2.7 Performance Enhancements of Aircraft Sharing with Partner A1

This form of collaboration was mainly aimed at reducing fixed capacities in the air freight network and thus reducing associated costs, whilst maintaining the route at a lower flexible capacity and not reducing the level of service available to customers.

6.2.7.1 Cost-Related Performance Enhancement

Cost savings were an important driver for this collaboration. Company A is aiming to reduce its expenditure on air freight by 150 million Euros by 2013 (Company A, 2011b). This is to be done through the reduction of fixed capacity and movement onto road. Since road would take significantly longer in this case, with flight time from East Midlands to Shannon being roughly 1h 15 minutes with the shortest ferry crossing to Ireland being about 3 hours plus the extra road miles that would need to be undertaken to the ferry port and then to the main sorting hub, moving completely to road would be difficult and would negatively affect services. Currently Company A offers full normal services to Ireland including 9am delivery

with a lead time of 1 day and economy services with a lead time of 2 days. To keep these services, collaboration is the only way to reduce fixed airfreight capacity.

In cost terms, Company A has taken away from that route the cost of the aircraft, the running costs of the aircraft, the maintenance costs of the aircraft and the cost of paying the crew of the aircraft. A small percentage of these costs are included in the cost of using Partner A1's network but Company A still believes that it has effectively reduced the aforementioned costs to zero. This has proved to be a particularly effective form of collaboration for cost savings and one that Company A is trying to implement in other areas.

Most importantly, Company A has reduced its fixed capacity on a low capacity utilisation route. Company A is not paying for excess capacity, as its contract with Partner A1 does not require it to pay for a fixed capacity regardless of the actual capacity needed.

6.2.7.2 Efficiency-Related Enhancement

This freight consolidation partnership has improved Company A's efficiency, as previously it was operating a flight from East Midlands to Dublin every day that was not operating to full capacity. Partner A1 was also operating a flight service that was not operating to full capacity, by allowing Company A1 to use its service Partner A1 is maximising its own capacity usage, whilst allowing Company A1 to reduce both its unused capacity and its fixed capacity.

A significant reduction has been seen, since the economic crises, in the amount of freight being delivered by air for inter-European journeys. Inter-European freight decreased by 2.4% in March 2012 (IATA 2012) when an overall global average of 1.5% was seen. This decrease is illustrated in Figure 6.13.

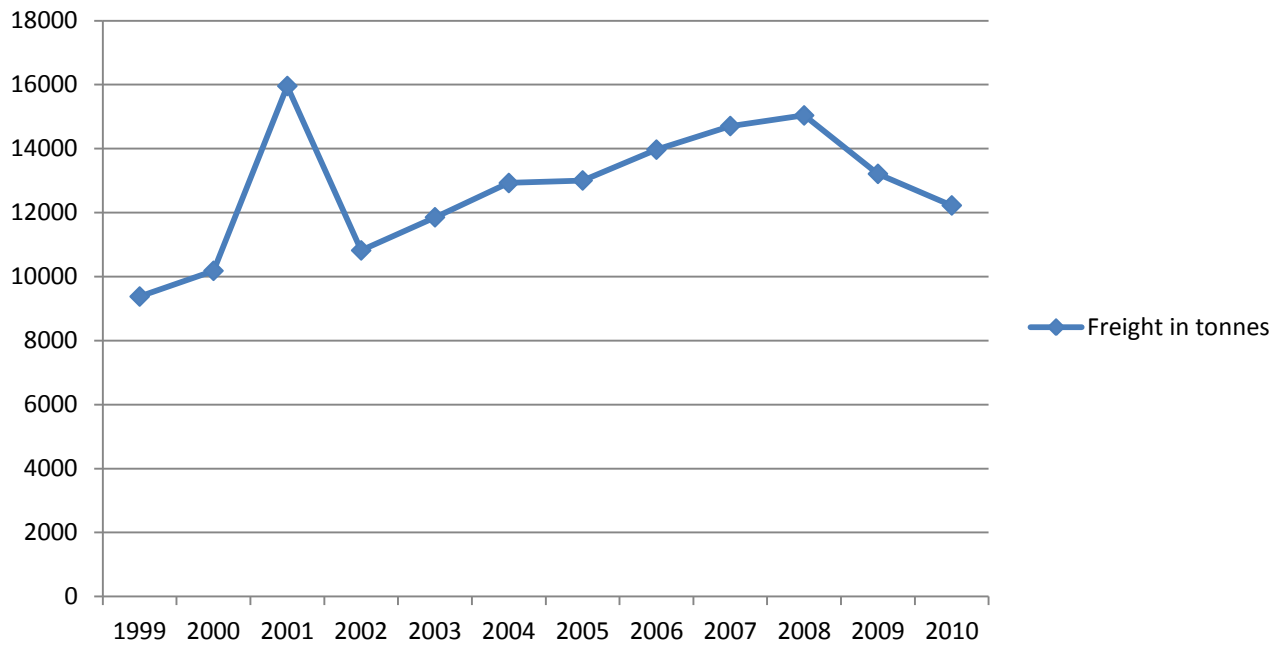


Figure 6.13: Tonnes of airfreight handled across Europe (Eurostat 2012)

This reduction, after a period of fairly steady growth from 2002 to 2008 will have led to the majority if not all air freight companies having excess capacity on its inter-European routes and/or the cutting of the frequency of flights on many routes and/or the termination of some routes.

The low utilisation of capacity is a major problem that is seen throughout the air freight industry, with the majority of flights currently operating at below 50% utilisation, as is illustrated by Figure 6.14.

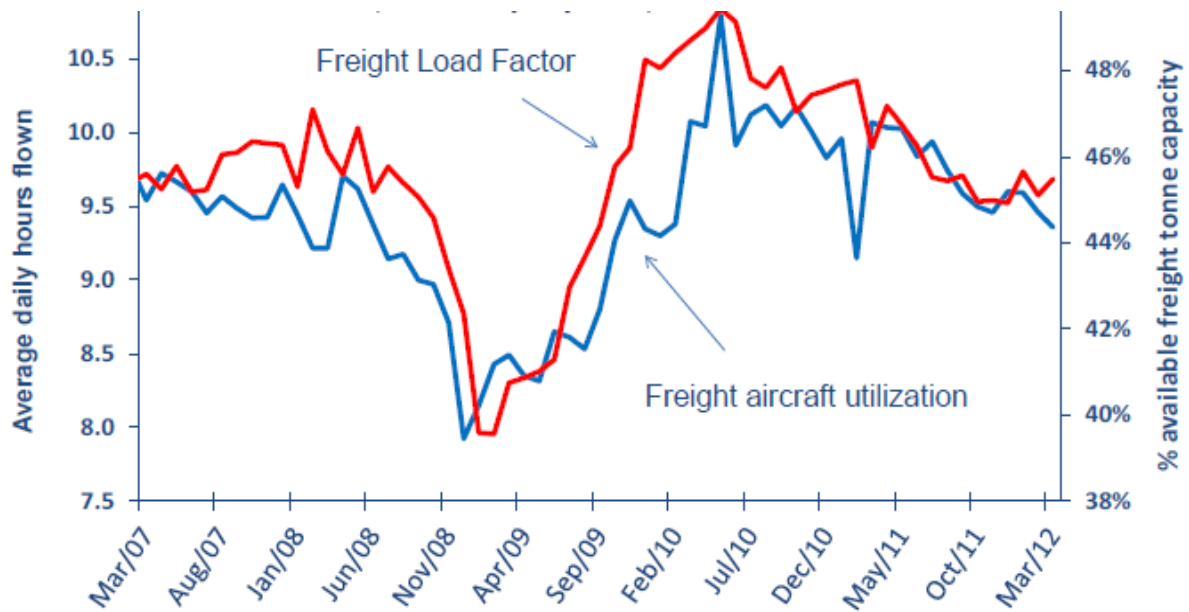


Figure 6.14: Freight capacity utilisation (IATA 2012)

Company A’s capacity utilisation for the Dublin flight was considered to be below industry average, with the average for the previous year being significantly below 50%. Partner A1 would have to be operating its East Midlands to Dublin flight at considerably higher than average capacity utilisation for Partner A1 and Company A1’s freight to completely fill the aircraft, allowing for flight sharing to be undertaken without a major customer service risk to either company, as it means the chances of Company A’s freight and Partner A1’s freight to Ireland completely filling the capacity is unlikely. This is of particular importance to Company A as it does not have a specific capacity utilisation on this flight and if Partner Company A had high levels of capacity utilisation, there may not be enough capacity left for Company A’s freight. However, this arrangement could potentially almost double overall capacity utilisation for the flight.

6.2.7.3 Customer Service-Related Performance Enhancement

Given that the operation of its own flight had become a non-cost effective way of operating, Company A was faced with a number of options. The collaboration with Partner A1 was the

one that was least likely to affect its customer service levels. The first option available to Company A was to keep its flight service open; however, as this would not have been cost effective it would have led to Company A having to increase costs in order to make this service viable. In an industry where costs are generally increasing, this is likely to have made the service uncompetitive. Company A's base service prices increased by around 11% for its Express services between 2011 and 2012. This would have been increased if these cost increases had needed to absorb the costs caused by operating a flight to Dublin below full capacity.

The second option would have been to cut the quicker premium rate services and deliver by road only. This would have led to them only delivering Express and therefore not only would this reduce the level of customer service but would also lose Company A the higher rates for faster delivery. Considering base rates only, the faster service have a 70%, 130% and a 200% cost increase attached to them compared to the normal express service. Using road only would potentially lose Company A both customers and income from existing customers.

6.2.7.4 Flexibility-Related Performance Enhancement

This collaboration has reduced Company A's fixed capacity, allowing it to move resources onto other routes, whilst keeping this route open. This increases Company A's network flexibility and allows the resources to be used on other routes. This collaboration does, however, mean that it has a smaller capacity available on that route, a capacity that would meet previous demand levels but if a higher peak in demand was seen, this collaboration may mean that Company A are unable to cope with a higher level of demand.

6.2.8 Performance Enhancements in Relation to Indicated Key Drivers

The Company A questionnaire responses indicated that Company A is using horizontal collaboration to access new markets, reduce costs, reduce procurement costs, enhance

customer service, demand fluctuations and reduce carbon emissions. This case has shown enhancements in the following areas.

- Reducing costs; whilst this has been considered to be a major benefit of the collaborations Company A has been involved in, the magnitude of cost reductions have been difficult to quantify, as the interviewee at Company A was unable to find substantial quantitative information relating to cost reductions gained from horizontal collaboration. Horizontal collaboration has allowed it to reduce its aircraft costs which account for around 25% of its total expenditure on property and equipment. This is key to Company A's medium term goals as it is aiming to cut aircraft costs by 150 million Euros by 2011.
- Reduction of procurement costs; it is believed that this case has caused a decrease in procurement costs as Partner Company A1 has a larger aircraft fleet and therefore has more purchasing power in terms of fuel, which will decrease the level of costs passed on to Company A.
- Easier response to demand fluctuations; Company A's motivation in the aircraft sharing collaborations was to reduce fixed capacity, in an attempt to allow for easier response to demand fluctuation.
- Reduce carbon emissions; in 2011, Company A's overall CO₂ emissions according to the Greenhouse Gas Protocol were 2747ktonnes up 28ktonnes on the previous year. However, its CO₂ emissions due to flights fell by 78ktonnes whilst its CO₂ emissions due to road transport only increased by 2ktonnes, suggesting Company A is managing to cut its carbon emission from its core processes and horizontal collaboration projects such as aircraft sharing will have contributed to this reduction.

6.3 Case Study 2

This case study concerns, Company B, a small freight forwarding company and its freight consolidation practices with Partner B1. This case was carried out using the case study protocol described previously and involved two interviews with the Managing Director of the company, observation of the operations and a set of follow up questions answered by e-mail.

6.3.1 Introduction to Company B

Company B is a privately owned, well established freight forwarder with offices in the North East of England and Scotland. Like a large percentage of companies that responded to the survey, Company B was classified in terms of company type as solely a freight forwarder. Company B was established in 1995 and its turnover in 2011 was 7 million pounds. Company B's main focus is on the provision of road transport across Europe. Despite its main focus being on road, Company B also provides sea and air services including services outside of Europe, mainly to the Far East.

The majority of Company B's business comes from providing groupage services to manufacturers based around its main offices in terms of both imports and exports. Company B has, through its own contacts and those of its partner companies abroad, also developed a complementary foreign customer base to allow it to operate its routes profitably in both directions. Company B also offers courier services for small loads and Express road services for urgent deliveries. Express services include same day and next day services for delivery in the UK and next day delivery services for delivery in Europe.

In terms of ocean freight provision, this accounts for around 25% of Company B's turnover. The majority of these consignments are imports into the UK from the Far East. However, Company B can offer import and export services at all major UK ports and then services to

over 75 different ports in 60 countries. As with the road services, Company B specialises in groupage ocean freight services although it can also offer services for full container loads.

To facilitate the groupage nature of its operations and to allow it to offer some value-added services Company B operate a large warehouse, which can hold around 700 pallet spaces, in the North East of England. It is at this base that Company B loads and unloads containers and undertake cross docking operations. Company B also offers its customers short and long-term storage contracts for this facility. Value-added services offered from this facility include stock management, pick and pack services and transfer-to-pallet services.

Figure 6.15 provides some key financial and statistical information concerning Company B. Through the FAME database figures were only available up until 2008 for most data. However, since the horizontal collaboration implementation considered in this case study occurred in 2005, these figures will allow for the company to be placed in context at the relevant time. These have been presented in graphical form rather than tabular form to allow easier comparison of the trends over time.

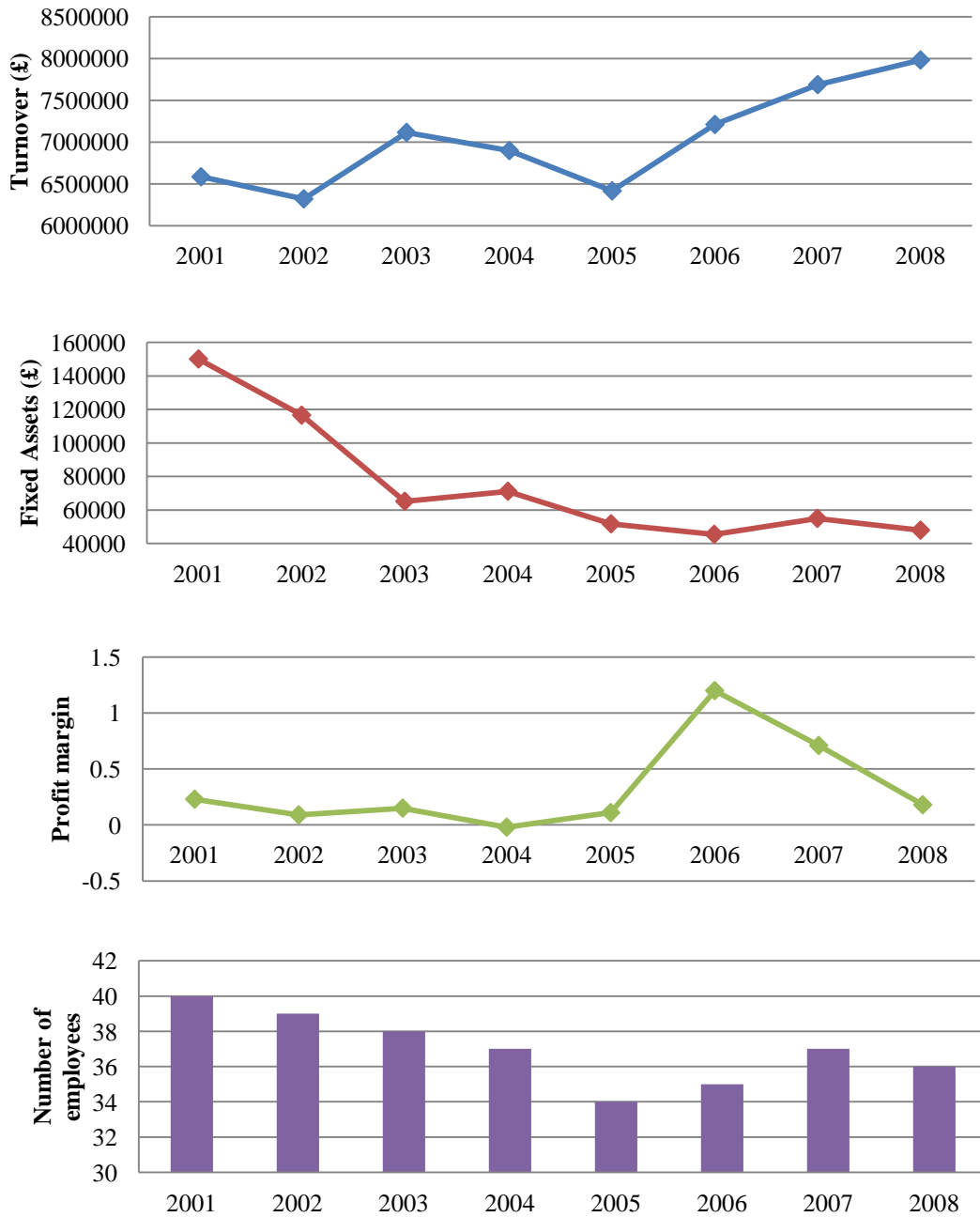


Figure 6.15: Company B financial charts (FAME, 2012a)

It can be seen from Figure 6.15 that generally Company B's turnover has increased. However, this has not been a linear increase, with a severe decrease occurring in 2005 due to loss of freight on some of its key routes. Company B's turnover put it in the second of the size categories used in the survey putting it in the top 50% of respondent companies in terms of size. Company B has significantly decreased its fixed assets over the 7 year period; this has been done through partnering with other firms.

Company B's profit margin and net assets' turnover figures show less definite trends. Company B's profit margin ranges from -0.02 at its lowest in 2004 to 1.2 at its highest in 2006. This peak is still lower than the average profit margin for freight forwarders in the UK, which in 2006 stood at 3.02 (Meyer-Ruhle O et al, 2008). The fluctuation in Company B's profit margin is thought to correspond to the implementation of a collaboration project and to the general economic downturn. Company B's employee figures are one of the few key statistics that shows a fairly consistent picture, with a fluctuation of only 15%.

Having established that Company B appears to be operating in a fluctuating environment, the general industry around it was considered to see if Company B's situation was reflective of the whole industry. Figure 6.16 shows the total import and export values for the UK.

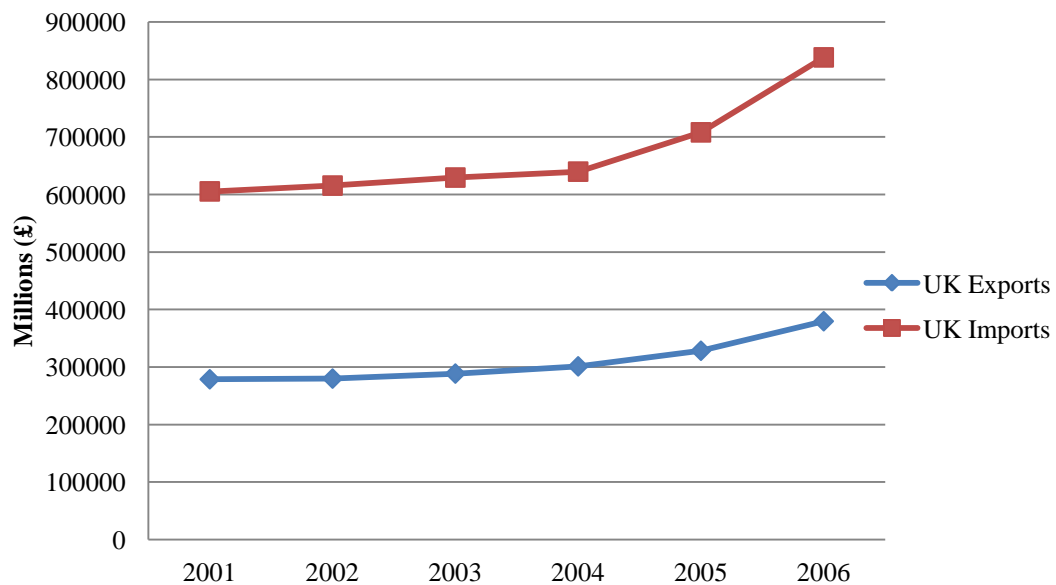


Figure 6.16: UK total import and export figures (HM Revenue and Customs, 2011)

Figure 6.16 suggests that generally the freight market increased between 2001 and 2006. However, factors such as rising fuel costs and changes to the locations freight is being shipped to will have affected Company B's turnover and profit. The issue of changing freight levels to and from Company B's key markets will be discussed in more detail in further sections.

6.3.2 Company B's Questionnaire Responses

In the initial questionnaire it was indicated that Company B was involved in both collaborating with direct competitors and looking for potential partners. This was found to be common in the questionnaire results with 78% of companies who were collaborating with competing companies also indicating that they were still looking for partners. Company B currently work with a wide network of partners but as the destinations and quantities of the freight they handle changes, it change its partners to best suit its needs.

Company B's managing director believes that the main drivers for implementing horizontal collaboration are to access new markets, reduce transport costs and improve vehicle utilisation, suggesting its focus would be on using horizontal collaboration to cut costs through improved efficiency. This differs slightly from the response profile with reducing transport costs and accessing new markets being in the top 3 responses. However, the third most popular was enhancing customer service with improving vehicle utilisation coming in fourth. Enhancing customer service was a particularly popular response for companies of Company B's size.

Company B's managing director indicated that lack of trust and fear of competitors accessing sensitive information on business operations were two of the main barriers to collaboration. These were the top 2 barriers identified in the questionnaire by a considerable margin. Difficulty in estimating the savings of the cooperation in advance, the third barrier indicated by Company B's Managing director was a less popular response, with 18% of respondents indicating that they believed it was a barrier to horizontal collaboration.

Like the majority of respondents, Company B is involved in both shared services and freight consolidation including the sharing of truckloads, containers, pallets and warehouses belonging to Company B. In terms of effectiveness of these collaborations, consolidation of

freight flows was indicated to be very effective but shared services were indicated to have a negative effect.

Company B collaborates with 14 different companies and has been involved in horizontal collaboration since it was established in 1995. Partnerships were indicated to be long term, generally with companies in Europe or the UK of a larger size than Company B.

6.3.3 Rationale for this case study

This case was chosen for a number of reasons; it was originally short listed due to its convenience in terms of location, being one of only a small number of respondents located close to the researcher. This case was selected to be a complementary shared services case to be compared to the shared services seen at Company C in terms of back hauling and at Company A in terms of flight code sharing. This case, which was intended to involve warehouse sharing should have provided an insight into a different type of shared services. This case also had the potential to show a different perspective to those already seen as the respondent had indicated a negative relationship between sharing services and performance.

Unfortunately, the respondent was unwilling to talk about the lack of success they had achieved through the sharing of warehouses and explained that this was an initiative they had now stopped due to it not being cost effective or helpful to its business.

The respondent was, however, willing to discuss the consolidation of freight that was being undertaken and the conversation was steered towards a specific example, which was the collaboration with its German partner as this is one of its more recent collaborations and one that is key to the company operations due to the high importance of the UK – Germany route.

For these reasons, this case provides a second example of freight consolidation to be compared with freight consolidation of air freight to Ireland as seen in case study one.

6.3.4 Network Structure

This section will focus on Company B's road network as this provides the majority of Company B's business. Company B runs scheduled services to the majority of Europe, as shown in Table 6.9.

Country	No Import Services per week	No of Export Services per week
Austria	1	1
Belgium	2	2
Bulgaria	1	1
Channel Isles	2	2
Czech Republic	1	1
Denmark	2	2
Finland	1	1
France	2	2
Germany	3	2
Greece	1	1
Hungary	1	1
Ireland	2	7
Italy	2	2
Netherlands	2	2
Norway	1	1
Poland	1	1
Portugal	1	1
Romania	1	1
Turkey	1	1
Russia	1	1
Slovakia	1	1
Spain	1	1
Sweden	1	1
Switzerland	2	2

Table 6.9: Company B's European road services (adapted from Company B, 2011)

Table 6.9 shows that Company B runs at least weekly import and export services to all major European countries. The lack of symmetry in the number of import and export services seen in the case of Germany and Ireland are due to network partners using the full capacity or the majority of the capacity on one service meaning that journey is unavailable to Company B's customers.

Company B's service offerings are underpinned by the use of 14 different partners, operating in the countries shown in Table 6.9. These tend to be of similar size or slightly larger than Company B and, like Company B, specialise in groupage freight into and out of a certain area. Moreover, these companies specialise in areas of European countries that Company B has potential customers for.

An example of one of these partners is Partner B2, an Italian logistics company, whose headquarters are located in northern Italy. Like Company B, Partner B2 is an owner managed company that offers part and full load services across its European road freight network and deep sea freight services for destinations outside Europe. Similarly to Company B it works with a number of other partners, and advertises that it works with around 52 different partners including Cargo Line, China Global Logistics Network, COSCO International and Servizi Espressi Italiani (Partner Company B2 2012a).

Partner B2 is one of the largest partners Company B works with. Table 6.10 shows a comparison of a number of key figures for both companies.

	Company B	Partner B2
Year founded	1995	1936
Number of employees	40	430
Turnover (2008) (£)	982,294	122,922,214
Number of branches	2	16
Countries in which the company has offices	England Scotland	Austria Belgium Germany Italy Netherlands Russia

Table 6.10: Comparison of Company B and Partner Company B2 (information compiled from the FAME database (2012) and Partner Company B2 (2012b))

It can be seen from Table 6.10, that Partner B2 is a much larger and much more established player in the logistics industry than Company B. Partner B2 has a turnover that is around 122 times greater than Company B's and was established in 1936, whereas Company B is a relatively new company. It should be noted that despite Partner B2's presence in multiple countries, Company B only works with Partner B2 in Italy.

Company B's strategy, in terms of collaboration, is to work with companies which specialise in a particular region like itself. It is partially for this reason that it only works with Partner B2 within northern Italy, which is Partner B2's leading area of expertise. In some countries where Company B has low volumes or concentrated demand they work with a single partner, whereas in countries such as Italy it works with 5 different partners. Figure 6.17 shows the typical supply chain for a Company B consignment, in terms of the activities that Company B is responsible for.

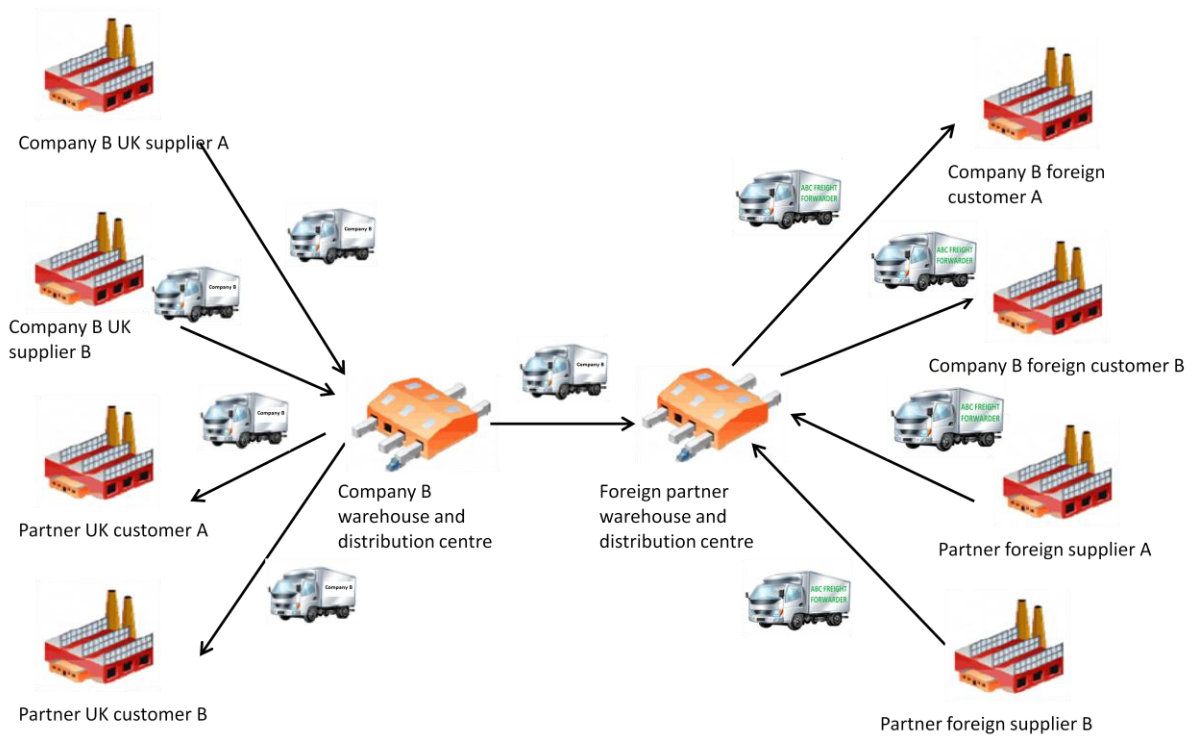


Figure 6.17: Company B’s road freight supply network

The majority of consignments Company B collect in the UK are from its own customers although they do collect some consignments in the UK for its partner logistics firms. Table 6.11 shows the percentages of overall freight, to and from a number of its key destinations, from Company B’s direct customers and from its partner’s customers.

Country	Company B Percentage	Partner Percentage
France	90	10
Germany	65	35
Italy	50	50
Switzerland	50	50
Overall	70	30

Table 6.11: Percentage split of freight

In the majority of cases once consignments have been collected by Company B they will be taken to Company B’s warehousing and distribution centre at Leeds Container base. Consignments will usually be picked up by smaller vehicles which will either serve one

customer/supplier or a small number when the loads are small and the suppliers/customers located close to one another. In a minority of cases, where the supplier's consignment is a full load rather than groupage, the consignment may not go through the warehouse and distribution centre.

Once consignments reach the warehouse and distribution centre they will either be stored in the warehouse for the necessary period of time or loaded straight onto a larger vehicle for transportation to the appropriate country or region. A typical vehicle will be carrying 30-40 different consignments on any one journey. The consignments will then be transported to its partner's warehouse and distribution facility where the consignments will be split up and possibly recombined for delivery to the necessary customers by its partner's trucks.

The Company B truck will then be loaded with consignments to go to Company B and its partner's customers in the UK, which will be taken to Company B's warehouse and distribution centre to be split and then delivered to the relevant customers.

The main exceptions to the network map shown in Figure 6.18 are consignments being delivered to Lyon in France. These consignments go through a more complex network with an extra partner being involved. These consignments start off with a similar route to any others and the difference only occurs when they get to the warehousing facility of Company B's French partner in Paris. From there, rather than being delivered straight to the customer they are delivered to a partner of its French agent, a further freight forwarder that is based in Lyon, which then delivers them to the customer. This occurs because Company B has not managed to establish a satisfactory relationship with a freight forwarder in Lyon, which is believed to be due to the small volumes it is delivering to this area.

Company B has been working with different partners for differing lengths of time; Company B has been working with its longest established partner for over 30 years. Its newest

partnership is with a company in Germany, Partner B1, and was established in 2005. In the majority of countries Company B works with a single partner, however, in both Spain and Italy, Company B work with a number of partners due to the wide geographical spread of its customers and historically, the high level of consignments to these countries. For example, in Italy, Company B has a partner in Rome, Prato, Verona, Turin and Milan.

In addition to its normal road services, Company B also offers express services both in the UK and in Europe. In the UK, these are in the form of same day or next day delivery services, whilst in Europe these are next day delivery services. These services can utilise vehicles with a 1 pallet capacity to 13.6m trailers. Company B can also provide double vehicles to allow for the facilitation of quicker journeys. In this case Company B monitors the customer's shipment from collection to final delivery.

In terms of ocean freight, Company B has regular bookings with a number of shipping lines, to allow it to offer weekly services to a wide variety of non European destinations. A typical supply chain for a Company B import consignment is shown in Figure 6.18. An import supply chain is shown as import consignments make up the majority of Company B's ocean freight business.

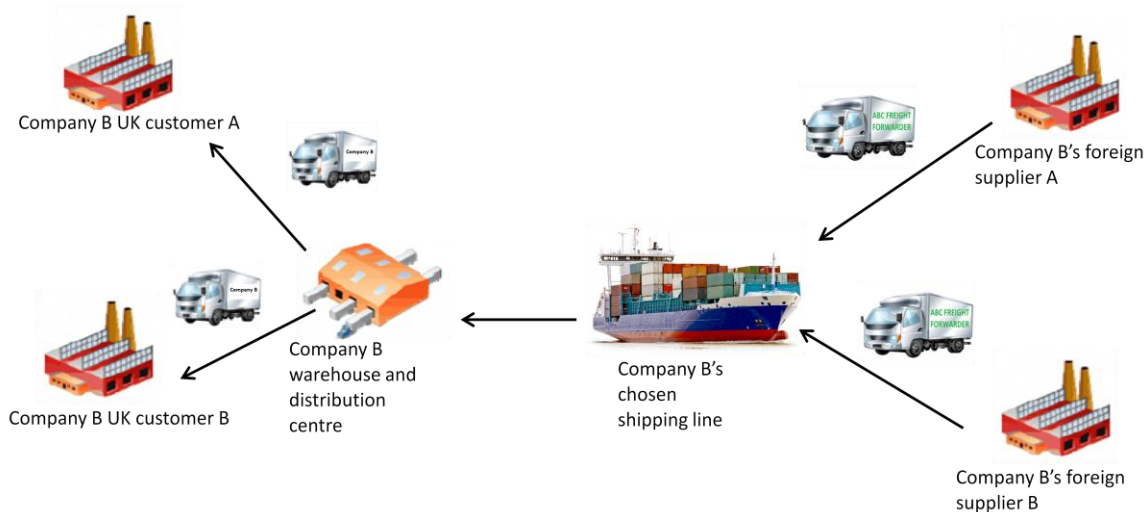


Figure 6.18: Company B ocean freight supply chain

Figure 6.18 shows that the consignments are picked up by a Company B's partner in the relevant country, which then delivers the consignments to the shipping line that Company B has booked capacity with. Company B works with a number of shipping lines but the main one is CMA-CGM. The majority of consignments are shipped into Felixstowe although Company B does use other UK ports. In the case of full loads, the consignment will then be transported, by Company B, directly to the customer. In the case of smaller and groupage loads the consignments may be delivered to the Company B warehouse and distribution centre.

In terms of airfreight, through arrangements with air cargo carriers Company B can provide import/export services from most UK airports to anywhere in the world. This is facilitated by agreements with a multitude of major airlines. Company B offer economy and express services to cater for differing lead time and concerns. Company B can provide import clearance at all major UK airports as well as duty and VAT facilities. In most cases it is able to offer a door-to-airport service.

Company B's warehouse, storage and distribution facility is based at Leeds container base and has 700 pallet spaces, which can be rented on short or long term contracts. Company B

provides unloading and loading services at the warehouse and distribution facility which has multiple-level vehicle docking systems. Company B can also offer complete stock management for warehouse goods, pick and pack services and transfer to pallet services.

6.3.5 General Horizontal Collaboration Advantages

For Company B, collaboration with other freight forwarders is the only way to stay in business. It does not have the volumes to set up its own facilities in the countries it delivers freight to and delivering multiple consignments across a country itself would be prohibitive in cost terms due to the higher mileage as it would have to pay for the empty running miles which would be the entire trip back, plus there would also be the cost of the journeys within the country when the truck would be running partially empty as it delivered consignments. This round trip would cause deliveries to take longer, as many of the grouped consignments sent to a particular country are then split up by the foreign partner and sent on in different trucks to do shorter round trips in different locations. Even if Company B sent a double manned truck and undertook the entire route on its own, there would need to be extra time allocated for breaks due to the journey being undertaken by one vehicle and crew, which would also add to the journey time.

In addition to this, as was illustrated in Table 6.11, many of the foreign partners Company B works with provide freight for the same or opposing routes. This is particularly useful if foreign partners can provide consignments for export from the UK, as generally there is more freight being imported into the UK than exported. This is illustrated by Figure 6.19 which shows the trading imbalance for the UK for the last ten years.

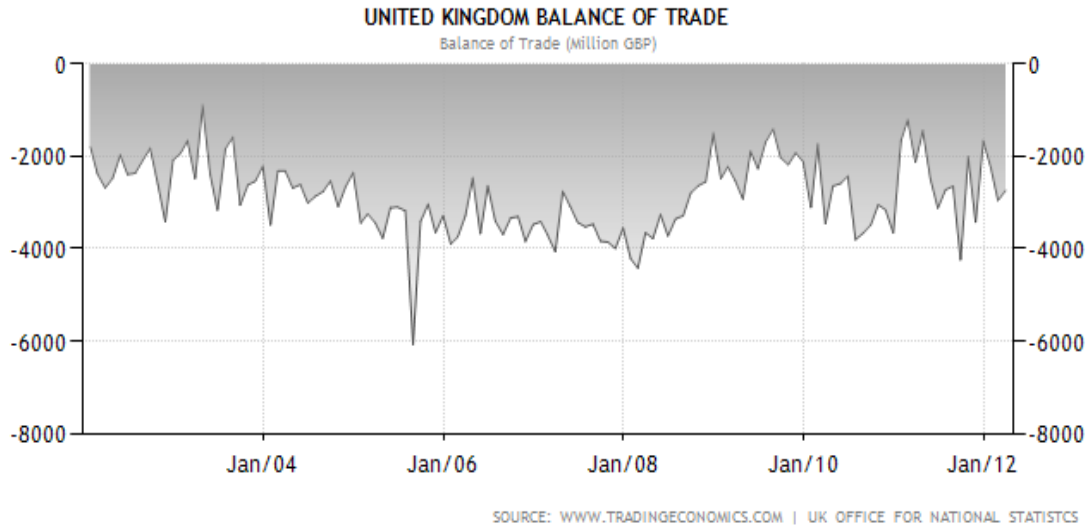


Figure 6.19: UK trade imbalance (UK Office for National Statistics cited by Trading Economics, 2012)

Figure 6.19 shows a significant imbalance between imports and exports consistently over the ten year period. Tables 6.12 and 6.13 explore this further as they provide figures for UK imports and exports in 2010 and 2011 by country by freight value and net mass. These tables were adapted from a HM Revenue and Customs publication showing the top 50 import and export countries. The tables shown in this report exclude the countries that do not appear on both lists as there would be no comparison to make and exclude countries that Company B does not import and export to. The few instances suggested where exports exceeded imports for a certain country are highlighted in red.

Statistical value (£)

	Imports		Export		Percentage difference	
	2009	2010	2009	2010	2009	2010
Australia	2,135	2,174	2,795	3,175	-31	-46
Austria	2,254	2,609	1,250	1,429	45	45
Belgium	14,894	17,025	10,533	12,946	29	24
Canada	5,270	6,811	3,616	4,318	31	37
China	22,871	28,228	5,129	7,225	78	74
Czech Republic	3,292	3,966	1,396	1,766	58	55
Denmark	3,770	4,069	2,427	2,681	36	34
Egypt	657	674	945	1,135	-44	-68
Finland	2,091	2,147	1,333	1,454	36	32
France	20,502	21,780	18,014	20,262	12	7
Germany	39,628	45,617	24,829	28,539	37	37
Hong Kong	7,178	7,553	3,512	4,202	51	44
India	4,325	5,447	2,893	3,952	33	27
Indonesia	1,166	1,316	350	439	70	67
Irish Republic	12,264	12,735	15,484	16,375	-26	-29
Italy	12,100	14,001	8,225	8,798	32	37
Japan	6,232	7,529	3,363	4,101	46	46
Netherlands	21,561	26,215	17,613	20,537	18	22
Norway	15,085	19,459	2,692	3,006	82	85
Poland	4,604	6,067	2,703	3,676	41	39
Portugal	1,396	1,719	1,494	1,778	-7	-3
Romania	770	1,232	666	760	13	38
Russia	4,452	5,172	2,286	3,451	49	33
Saudi Arabia	669	927	2,648	3,077	-296	-232
Singapore	3,372	3,989	2,846	3,284	16	18
South	3,583	4,114	2,143	2,764	40	33

Africa						
South						
Korea	2,686	2,408	2,026	2,205	25	8
Spain	9,124	9,967	8,985	9,700	2	3
Sweden	5,423	6,514	4,105	5,408	24	17
Switzerland	5,724	8,428	3,879	5,218	32	38
Taiwan	2,096	2,892	751	1,050	64	64
Thailand	2,150	2,520	860	1,069	60	58
Turkey	4,317	5,050	2,232	3,074	48	39
UAE	1,137	1,669	3,556	3,892	-213	-133
USA	28,422	31,352	33,570	37,413	-18	-19
Overall	277,199	323,375	201,149	234,157	27	28

Table 6.12: Value of imports and exports by country (adapted from HM Revenue Customs 2011)

Table 6.12 shows that for the majority of countries Company B imports and exports to, the value of Imports is higher than the value of exports. In 6 of the cases, China, Czech Republic, Hong Kong, Norway, Taiwan and Thailand imports exceed exports by over 50% of the value in at least one of the years. There were only 3 cases, France, Singapore, South Korea, where the difference has been less than 20% in either year.

Despite this general trend of imports exceeding exports, there were 7 countries where export value exceeded import value in both years; these were Australia, Egypt, Irish Republic, Portugal, Saudi Arabia, the UAE and the USA. In cases such as Portugal this was by a small amount, with a single digit percentage difference. The most extreme cases were those of Saudi Arabia and the UAE where differences of up to 75% and 68% were seen.

Table 6.13 shows the import export data by mass, the reason for the use of both sets of data are that either could potentially be skewed by the type of consignments being carried. The figures in Table 6.12 will be affected by the value of the consignments, if particularly high

value goods are being imported or exported this could skew the data. In the case of Table 6.13, consignments being imported or exported could be particularly heavy and that would skew the results. By using both sets of data a general impression can be gained if similar patterns are seen in both sets of data.

	Mass (net tonnes)				Percentage difference	
	Imports		Exports		2009	2010
	2009	2010	2009	2010		
Australia	4,289,419	3,938,893	319,274	357,549	93	91
Austria	637,557	815,451	213,620	256,442	66	69
Belgium	7,538,944	8,679,906	8,036,891	14,099,668	-7	-62
Canada	2,822,839	3,370,827	1,192,094	1,513,927	58	55
China	5,936,870	7,294,816	4,680,466	4,265,498	21	42
Czech Republic	707,781	766,900	272,208	340,698	62	56
Denmark	2,332,854	2,541,188	2,047,957	2,139,060	12	16
Egypt	1,105,699	1,019,599	946,942	1,489,455	14	-46
Finland	2,540,247	2,599,941	962,311	1,029,254	62	60
France	10,924,837	10,692,365	11,311,077	12,282,383	-4	-15
Germany	14,509,949	15,613,108	15,493,324	18,086,464	-7	-16
Hong Kong	660,207	675,206	824,345	865,255	-25	-28
India	1,901,535	3,196,390	2,358,406	2,322,298	-24	27
Indonesia	2,216,532	1,063,094	642,107	436,005	71	59
Irish Republic	6,402,566	6,826,486	15,206,621	17,951,552	-138	-163
Italy	4,243,008	4,699,068	2,236,846	2,290,768	47	51
Japan	648,454	756,249	326,207	382,814	50	49
Netherlands	12,430,320	19,242,960	34,637,614	33,912,780	-179	-76
Norway	57,104,796	60,459,166	1,727,786	1,739,034	97	97
Poland	2,325,549	2,640,533	2,003,289	2,500,267	14	5
Portugal	969,115	919,016	2,201,749	2,305,413	-127	-151
Romania	164,522	351,969	130,002	161,563	21	54
Russia	26,216,845	17,524,890	449,552	616,351	98	96

Saudi Arabia	841,906	579,887	439,054	604,892	48	-4
Singapore	1,314,444	610,584	354,692	386,892	73	37
South Africa	4,108,656	2,332,289	519,857	630,590	87	73
South Korea	1,004,216	550,692	1,361,940	460,660	-36	16
Spain	6,128,877	6,938,155	6,797,625	6,189,496	-11	11
Sweden	7,243,261	7,635,189	2,624,393	4,191,758	64	45
Switzerland	298,947	213,754	195,284	188,371	35	12
Taiwan	418,219	534,888	263,584	361,814	37	32
Thailand	945,482	644,394	719,978	583,623	24	9
Turkey	2,645,107	2,222,282	1,592,798	2,437,663	40	-10
UAE	512,251	741,818	509,199	491,854	1	34
USA	9,500,781	9,208,243	19,282,132	15,403,433	-103	-67
Overall	203,592,589	207,900,196	142,881,219	153,275,544	30	26

Table 6.13: Mass of imports and exports by country (adapted from HM Revenue Customs 2011)

Table 6.13 shows a much more varied picture than Table 6.12, with 21 countries consistently showing higher imports than exports, 8 countries showing higher exports than imports in both years and 6 changing between the two years. With the exception of the UAE this table shows a higher imbalance in freight to the countries the UK is exporting more than it is importing to, with multiple countries cases where the export amount is around 100% more than the import.

Of the countries that showed higher exports than imports in both years, only 3 also showed higher exports in both years by value, Ireland, Portugal and the USA. Egypt showed higher values in both tables in 2010.

Despite the differences in the figures for the individual countries, the two data sources show a similar overall freight imbalance for each year. In 2009 by value, from the key countries Company B imports and exports to, 27% less freight by value was exported from the UK than was imported; by mass this figure was 30%. In 2010, the figures were 28% and 26% respectively.

This freight imbalance lowers efficiency levels in the industry, forcing transportation companies to operate journeys at lower capacities and leads to empty running miles. The Freight Transportation Association logistics reports suggest that the percentage of HGVs running empty in the UK has been consistently around 28% since 2008 (Freight Transport Association 2012a).

This freight imbalance leads to cost differences between the market rates for deliveries to and from UK. Table 6.14 shows the typical market prices for consignments imported and exported to Company B's largest markets from the UK.

Country	Import load price	Export load price	Percentage Difference
Germany	£1000 per trailer load	£400-£450 per trailer load	55%
Italy	£2800 per trailer load	£1300-1400 per trailer load	50%
Far East	£50 per pallet	£13 per pallet	74%

Table 6.14: Price comparison for imports and exports

The price comparison in Table 6.14 shows significant differences between the import and export market prices. All 3 comparisons show a price difference of over 50%. As these were the examples that the Managing Director at Company B picked to give, it would seem likely that these are the extreme examples and were given to illustrate the point although they do also correspond to Company B's key markets. This is partially supported by the import export tables, some of the far eastern destinations such as China, Taiwan and Thailand did show high percentage differences between import and export freight amounts, which would account for this high price difference. This difference is so significant that Company B has seen cases where deep sea shipping lines are offering to transport freight from Europe to Asia for free due to the severe lack of freight moving that way.

The import-export tables also support Italy being an example where there is a significant difference between exports and imports, with the lowest suggested percentage difference being 32%. However, Germany is slightly more complicated. It would seem logical that Germany would export significantly more to the UK, than the UK exports to Germany due to Germany's position as the world's second highest exporter (Armistead, 2012). The statistical value table agrees with this and shows a 37% difference which is perhaps more modest than would be expected but might be caused by imbalances in the value of the average freight being moved in each direction.

The mass tables suggest a different picture, showing a 7% and 16% higher rate of exports from the UK. Due to the figures shown in the value table and the fact that Germany is the second highest exporter, and that the UK is not the number 1 and that the market price per trailer load is higher for UK export to Germany than for imports from Germany, it seems likely that the type of freight being carried has caused significant bias in this figure.

These differences highlight a real difficulty in the freight forwarding business, collaborating with a freight forwarder in an area that Company B are importing/exporting to can significantly increase its chances of obtaining freight for the return leg of the journey thus decreasing the costs that are absorbed by Company B.

6.3.6 Case Description

This case focuses on Company B's work with an individual partner; the partner chosen was a freight forwarder in Dusseldorf as this is one of its more recently established partnerships, it was established in 2005 and this partnership was the first and currently only partnership with a German firm. Partner B1 is a similar sized freight forwarder specialising in the transportation of freight into and out of the west of Germany.

Company B's first and foremost reason for collaborating with a German partner was the increase in freight it had for the route to and from Germany. In 2012, 25% of Company B's road freight is accounted for by imports or exports from Germany, 10 years ago freight being imported and exported to Germany did not make up 1% of Company B's business. This has partially been due to the economic crisis and the reduction this led to in freight imports and exports from some of Company B's key countries including Spain and Italy. Table 6.15 shows the increase or decrease in freight on a number of Company B's key routes over the last 5 years.

Country	Percentage Increase
Austria	50%
Belgium	-50%
Far East	20%
France	20%
Germany	250%
Holland	0%
Ireland	-30%
Portugal	-50%
Spain	-90%
Switzerland	-9%

Table 6.15: Percentage change in key routes

Table 6.15 shows that the route to Germany has seen the largest growth over the 5 years and has been 1 of only 4 of Company B's key routes to see any growth at all over the last 5 years. It could be suggested that these percentage changes could be purely down to the severity of the economic crisis in each country, with countries such as Ireland, Portugal and Spain experiencing more drastic downturns in freight movement. Figure 6.20 illustrates the changes in import and export levels, measured by value, for Spain and Germany, the routes that Company B has seen the largest decrease and increase on respectively.

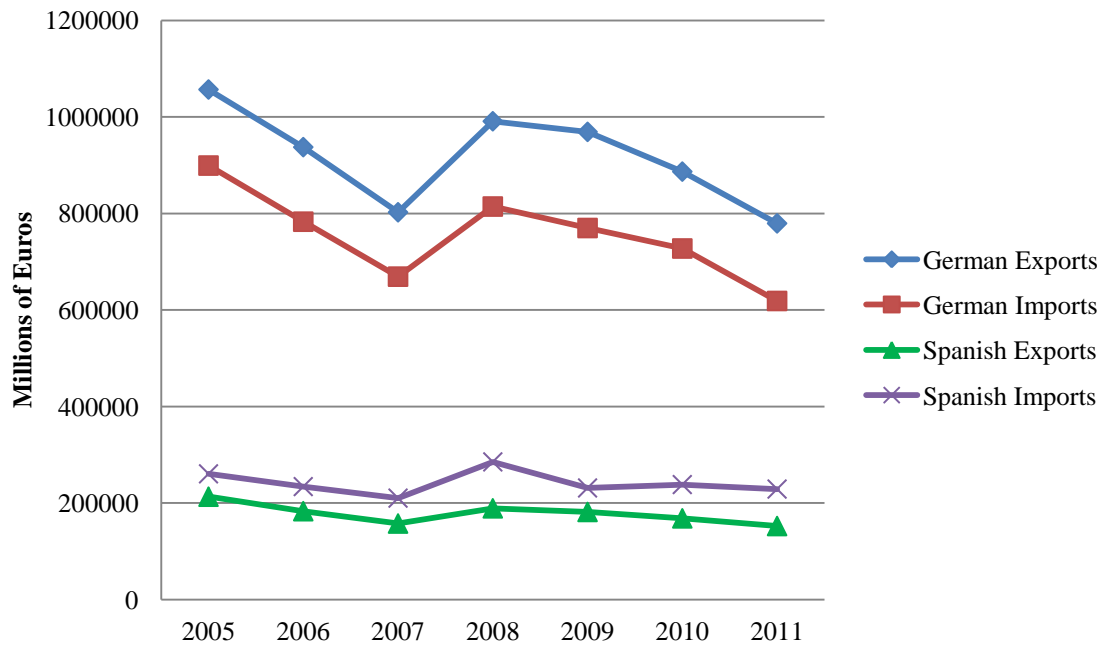


Figure 6.20: Comparison of German and Spanish Imports and Exports (German Federal Statistical Office and Ministerio de Industria collated by Trading Economics, 2012)

It can be seen from Figure 6.20 that the difference in the changes in import and export levels for Spain and Germany do not solely explain the high level of freight increase and decrease respectively that Company B has seen on these routes. The loss of Spanish freight is thought to be mainly due to decrease in exports from Spain; this suggests that Company B's customers for the Spanish route are mainly in the worst affected industries. It should also be noted that in case 4, an increase in freight on Company C's Spanish route was seen through a shared services approach, illustrating that some UK based freight forwarders are operating this route more successfully.

Considering the change to the German import and export levels, Figure 6.20 shows a decrease in exports and imports to Germany, rather than the drastic increase Company B has seen. This suggests that the collaboration with its German partner has allowed Company B to grow this route successfully despite a contraction in this market. Company B was already starting to see an increase in the freight on this route prior to the partnership and saw the

opportunity to grow this side of its business, and this prompted Company B to look for a partner in Germany in 2005.

Although it was already delivering to Germany at that point, they were doing so via a partner in Holland. Any shipments for Germany were delivered to the partner in Holland, which then sorted the shipments and delivered them to a partner of its own in Germany allowing the shipments to be fed into the German freight network, which would allow the shipments to be delivered by its German partner and other companies the German company was collaborating with.

When this was an unimportant route for Company B, this was an acceptable way of keeping this route open for the low level of freight it was being asked to deliver there. However, as this route became increasingly more important to Company B, improvements needed to be made to increase the cost effectiveness and efficiency of delivering to Germany and these improvements were made by developing relationships with a Dusseldorf based freight forwarder.

6.3.7 Performance Enhancements of Freight Consolidation

The performance enhancements in this case were based on cost savings and improving the efficiency of the delivery by removing a link in the supply chain through a change in collaboration strategy. Partner B1 has also provided 35% of the freight that uses this route, allowing the two companies to consolidate its freight. Whilst this has some advantages to Company B, including providing freight for the journey which Company B cannot usually fill as efficiently, Company B would prefer ideally to work with a customer base that is 100% its own as it receives a larger return on its own business than it receive on business it operate for its partner.

6.3.7.1 Cost Related Performance Enhancement

The cost related performance enhancements of this collaboration have been derived from the efficiency enhancements including decreased time in transit and a decrease in kilometres travelled which will be discussed in the next section. The move to working with a German partner has had significant cost benefits for Company B; however, the Managing Director of Company B was unable/unwilling to provide figures to quantify these benefits and would only provide an overview of the cost benefits that it has seen.

The first major cost benefit is that the freight is now only being delivered in conjunction with one other company, which has significantly decreased the turnover share of this route that is paid to other companies rather than Company B.

This reduction of parties in the supply chain has led to the removal of over a days worth of costs. Transit time for the freight on this route has been decreased due to the removal of unnecessary journeys; this has led to a decrease in transit time of one day. Company B's own drivers no longer need to make the unnecessary trip to the Dutch partner saving petrol costs and driver costs.

The reason that this partnership has decreased the cost by more than one days worth, despite the time reduction only being a day, is due to the reduction of a handling stage in the supply chain. Previously the freight was being unloaded and then reloaded at Company B, the Dutch partner and at its German partner which accounts for considerable cost in terms of equipment and man power.

Following the introduction of this partnership in 2005 Company B did see an increase in profit margins as seen in Figure 6.21.

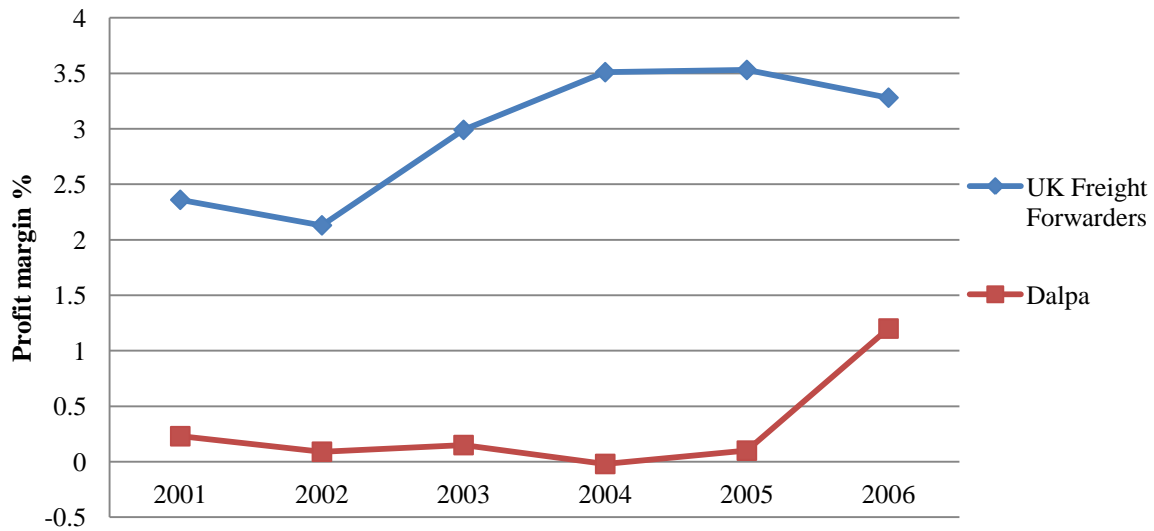


Figure 21: Comparison of Company B's profit margin with UK freight forwarders average (data compiled from FAME 2012 and Meyer-Ruhle 2008)

It can be seen from Figure 6.21, that Company B's profit margin increased drastically in 2006, which is believed to have been partially due to the partnership with the German company due to reduction of costs and the increase in freight on that route. Figure 6.21 also provides an industry context for these figures, it can be seen that Company B's changing profit margins do not match the trends seen by the overall UK freight forwarding industry. Company B did experience the drop the industry saw generally in 2002 but experienced a smaller increase in 2003 and then dropped again rather than increasing in 2004. This made 2004 the only year in which Company B failed to make a profit, this was part of the reason that decisions were made to change operations in this year, with one of the changes being the move to work with a German freight forwarder in 2005.

This led to Company B seeing a small profit margin increase in 2005 where the industry remains stagnant and to then increase drastically in 2006, where the market declined, which is thought to have been significantly influenced by the German partnership and the increase in freight on this route.

6.3.7.2 Efficiency Related Performance Enhancement

Improved efficiency was the main driver for collaborating with Partner B1. This has been achieved in a number of ways. Firstly, through cutting out the Dutch partner in the supply chain, the number of links has decreased, which has led to a significant decrease in the distance and the time taken in the delivery of the shipments to Germany. Table 6.16 shows the time and distance related performance enhancements that have been gained through this collaboration.

	In collaboration with Dutch partner	In collaboration with German partner	Percentage difference
Average km travelled	1050	900	14%
Average time (days)	4	3	25%

Table 6.16: Performance enhancements of collaboration

It can be seen from Table 6.16 that although there was a significant decrease in the average kilometres travelled, the time decrease was more significant. Due to the removal of a link in the supply chain, which has led to shipments being sorted twice, once at Company B's warehousing facility and once at the German partner's facility rather than 3 times as was previously occurring with the extra sort taking place at the Dutch partners warehousing facility. This was significantly increasing the time taken for the freight to reach its destination. It also increased the chance of damage to the freight due to handling.

The distance decrease was caused by two factors, firstly, by transporting the freight straight into Germany rather than going via the Dutch partner. Whilst the quickest route through to Dusseldorf still takes the freight through Holland, Company B's Dutch partner is significantly further north than the locations the majority of the destinations Company B are serving. The majority of Company B's German freight is imported or exported from the region around Dusseldorf, hence its decision to work with a partner based in this area.

The second factor is due to a shorter distance covered within Germany. Whilst Company B does not have the details of the German partner its Dutch partner was working with, it does know that the partner was not as conveniently located for its customers, leading to freight travelling unnecessary distances between the German partner and the customer.

6.3.7.3 Customer Service Related Performance Enhancement

Improved customer service was not a major driver of this collaboration, however, the increased customer demand for this route suggests that either generally freight on this route increased or that Company B's improved service attracted new customers. Obviously there are other factors that may have caused an increase in freight on the route, primarily, business brought in by the Partner B1 and changes to total import and export levels to Germany.

Some of the increase is accounted for by Company B's German partner attracting new customers to the route. However, this only accounts for around a 35% increase, whereas the overall freight on this route has increased by 250%. Considering changing overall freight levels to and from Germany, Figure 6.22 illustrates the changes in imports and exports to Germany from the UK over the past 7 years.

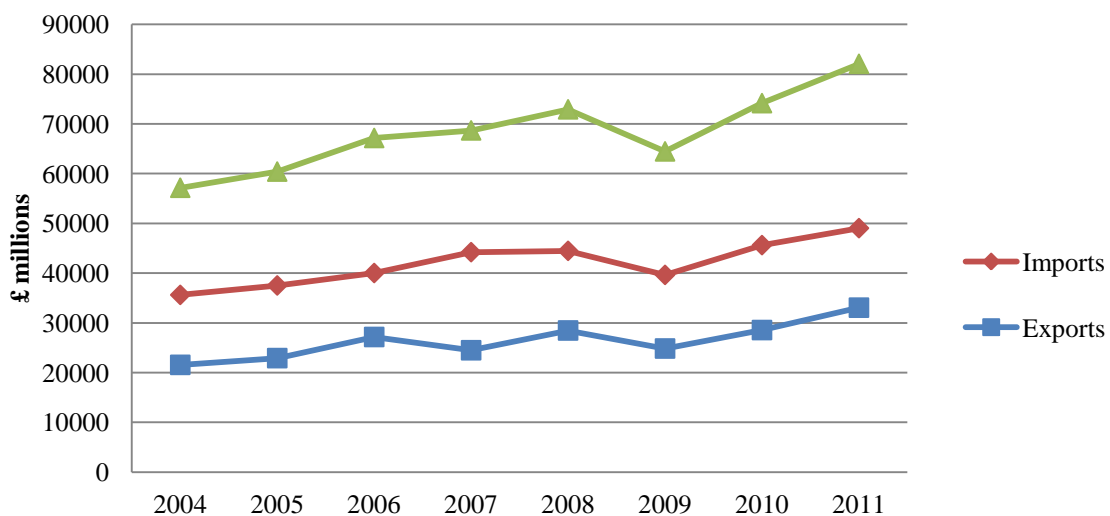


Figure 6.22: Imports and Exports to Germany (HM Revenue and customs, 2011)

Figure 6.22 shows an overall increase in the export and import values, but the total increase is only 30% rather than the 250% increase that has been seen by Company B. Company B's Managing Director believes that this increase in custom on its route to Germany is due to its improvements in customer service and the reduction of the transit time which has increased the attractiveness of its service. Existing customers on this route have also increased their business to Company B due to the improved service.

The increased freight has also led to further customer improvements with Company B being able to increase the number of services on the route. This has also been facilitated by the reduced time on this route and therefore the higher availability of its vehicles. Company B now operates services to Germany on 3 days a week plus additional services for full loads, whereas 5 years ago only one service was advertised a week.

6.3.7.4 Flexibility Related Performance Enhancement

Flexibility was not a major concern in the development of this partnership. As stated in the previous section, flexibility from the customers' perspective has increased, due to the increased number of services to Germany.

Company B, itself has, however, seen a slight decrease in its own flexibility due to the increased use of its own vehicles across the route to Germany. Although the total distance of the route has decreased the section undertaken by Company B's own vehicles has increased, leading to an increased usage of its vehicles which potentially has decreased its overall flexibility. However, Company B has decreased its costs through lower use of partners' fleets, which it believes to be more important.

6.3.8 Performance Enhancements in Relation to Indicated Key Drivers

As mentioned previously, the 3 drivers to horizontal collaboration, indicated in Company B's questionnaire response were to access new markets, reduce transport costs and improve

vehicles' fill utilisation. In terms of access to new markets, this collaboration has not allowed Company B to access a new market but it has allowed Company B to grow what was a small insignificant market, by 350% so that it became one of Company B's key markets. This has occurred by the addition of customers using the service that have been recruited by Partner B1 and the increased attractiveness of the route to Company B's existing customers and new customers due to increased frequency, lower journey time and lower costs.

In terms of improving vehicle fill utilisation, looking solely at this figure would not provide a true picture of what has happened in this case, as this may only show a small increase in vehicle utilisation due to the fact that the number of vehicles on this route per week have increased. Therefore, a graph of vehicle utilisation over time for this case would probably increase up to almost 100% and then drop again as a new vehicle was added. Overall, Company B has seen an increase in vehicle utilisation on this route and this, along with the reduction of the number of partners in the supply chain, has led to reduced transport costs.

This case has showed performance enhancements in two of the areas Company B believed to be major drivers to collaboration, increased vehicle fill utilisation and reducing transport costs and showed some enhancement in the area of accessing new markets. It can be concluded from this, that this has been a successful implementation of consolidation of freight.

6.4 Case Study 3

This case study concerns, Company A, which was described in case 1 and its collaboration with Partner A2, which is a shared services partnership. As this case was undertaken at the same company as case study 1 no further introduction to the company, network description or discussion of the questionnaire responses are provided, as these have already been discussed.

6.4.1 Rationale for this Case Study

As stated previously, cases with this company allowed for horizontal collaboration amongst large multinational companies to be studied in comparison to other case studies that have focused on much smaller companies. As with the previous case study, this case centres on airfreight infrastructure which is only provided by a comparatively small number of companies compared with those that have road freight infrastructure, giving cases 1 and 4 a different perspective to other cases which were undertaken.

In addition to this, case 4 provides an interesting comparison to case 1, as these both provide examples of freight consolidation and shared services being used to provide similar services, allowing for a contrast to be made between the reasons and ways the horizontal collaboration projects were undertaken and their benefits.

6.4.2 Capacity Sharing with Partner A2

Company A has a capacity sharing agreement with Partner A2 to allow the companies to share capacity. This started with the use of 3 of Emirates 747's and associated aircraft crew, which were used on a shared route from Europe to Asia. The aircraft were all originally provided by Partner A2 as it has 100 of its own aircraft compared to Company A which only has 46

This cooperation was expanded in March 2012, with a further code-share and blocked-space agreement being signed. This allows Partner A2 to share the airline code and space on Company A's B777 freighter flights from New York to Liege and from Hong Kong to Dubai to Leige. On the joint flights, the capacity allocated to Partner A and Company A are fixed with each company being allocated 50% of the volumetric weight capacity of the aircraft. The freight capacity utilisation graph presented in the previous case suggests that the 50% of this capacity is likely to be all Company A needs. This is a more complex collaboration as

code-share and blocked space agreements have led to the need to integrate some of the systems and back-office processes from the two companies that are involved in the booking of space on these flights.

The new agreement will use both Company A's aircraft and Partner B's aircraft and has enabled Company A to increase the flight frequencies on the Hong Kong-Dubai-Liege route from 4 to 6 flights a week (Gibot 2012). This will allow Company A to deliver urgent material every day of the working week.

As with the agreement with Partner A1, Partner A2's shipments enter Company A's supply chain, for a Company A operated flight, when they are loaded onto the aircraft and leaves the Company A supply chain as soon as they have been unloaded from the aircraft. In the same way Company A shipments enter Partner A2's supply chain, if it is a Partner A2 operated flight, when loaded onto the flight and leave Partner A2's supply chain once they have been unloaded from the aircraft. The services this agreement relates to are primarily used by business-to-business shipments.

In 2007, Company A agreed to a wet lease of a Boeing 747 to Partner B2 (Partner Company B2, 2007). This allowed Company A to reduce its fixed operating costs due to reduction of fixed capital and fixed capacity. Company A prefers to use a road network rather than an air network, as it is easier to keep fixed capacity low in a road network by using subcontractors to provide the majority of the capacity.

6.4.3 Performance Enhancements of Capacity Sharing with Emirates

This collaboration has given Company A two main benefits; firstly, it has increased the percentage fill of the pre-existing flights. Secondly, it has also allowed it to increase the number of flights, reducing the delivery time for a percentage of shipments, thus increasing customer service and/or allowing for new faster services to be offered.

6.4.3.1 Cost Related Performance Enhancements

The enhancement of the agreement between Partner A2 and Company A will enable Company A to optimise the cost of the existing flight services on these routes by increasing the percentage fill of the aircraft. This means the cost per volumetric weight of cargo is less and Company A will be able to make a greater profit and/or offer its customers cheaper services.

Whilst keeping costs as low as possible is important on all routes, it is likely to be of higher importance on the Europe – Hong Kong route due to the fact the air freight yields for cargo being moved between Europe and South East Asia have generally been lower than the global average over the past two years as illustrated in Figure 6.23.

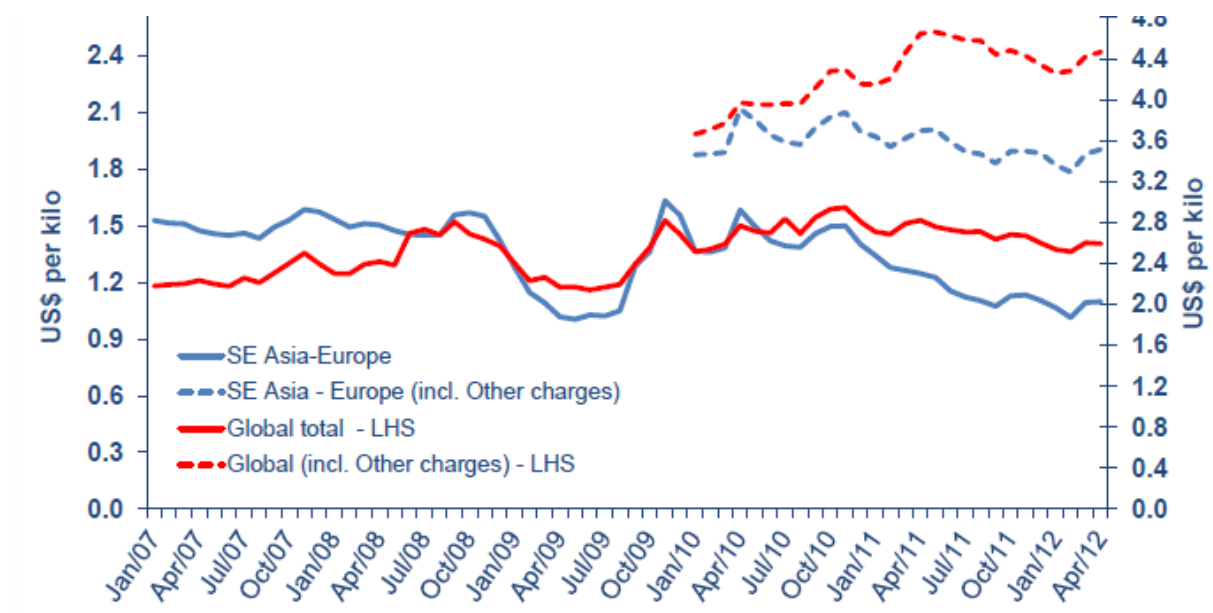


Figure 6.23: Airfreight yields per kilo (IATA, 2012)

These lower yields mean that profit margins are tighter and, therefore, efficiencies need to be higher for the company to operate these routes at a profit. Company A currently has four air hubs in South East Asia, these are Hong Kong, Chongqing, Shanghai and Singapore, therefore a significant percentage of Company A’s urgent material to south East Asia is transported as air freight to the Hong Kong hub and this route is key to Company A’s

profitability. Company A has chosen to collaborate in attempt to meet the challenges of operating this route. Whereas on other routes it has had to reduce capacity through using smaller plans or by cancelling flights, in 2011 Company A reduced its fixed capacity on Europe – China flights , to reduce the negative effect it was having on profitability (Company A, 2011b). By collaborating, Company A can further reduce its costs whilst increasing customer service rather than having to reduce services.

6.4.3.2 Efficiency Related Enhancement

Focusing on the Liege – Dubai – Hong Kong route, 2012 has seen further decline in the total air freight being moved from Europe to Asia, with small increases in the freight to the Far East and between the Far East and Middle East being seen in the most recent months. This is quantified in Table 6.17.

Month	Percentage growth in tonnes		
	Europe to Far East	Europe to Middle East	Middle East to Far East
Oct 2011	-10.5	-7.9	-8.5
Nov 2011	-10.2	-4.7	-8.9
Dec 2011	-7.1	0.4	-4.9
Jan 2012	-20.7	-12.4	-7.8
Feb 2012	-4.2	-1.6	10.5
March 2012	-4.6	2.6	4.9

Table 6.17: Growth rate in freight on the Europe Asia route (IATA 2012)

Table 6.17 suggests that the industry as a whole experienced a much higher decrease in air freight tonnage than has been experienced by Company A. Company A actually saw a 1.7% increase in air freight from Europe to the Far East in 2011 instead of the negative figures seen by the industry overall. However, in a volatile environment, maintaining efficiency can be very difficult. It was illustrated in the previous case that generally across the air freight

industry efficiency levels are low due to the average fill rate of aircraft currently being around 44%. When freight volumes are falling, obtaining profitable levels of aircraft fill becomes more difficult and will lead to even lower fill rates. If lower than average fill rates are being seen then sharing aircraft with another provider is likely to be possible without either company ever having more freight than space and would allow both companies to achieve fill rates much higher than the industry average, thus making both companies service more profitable or at worst less unprofitable than it currently is whilst still retaining high levels of customer service through frequent flights.

As stated in cost-related enhancements, this collaboration should increase the percentage fill of the aircraft, increasing the efficiency of this service. The efficiency of this service will also be increased as Company A finds it has considerably more cargo inbound to Europe than outbound and therefore are forced to operate the outbound journey at a low fill rate and therefore a low efficiency. Emirates has more cargo outbound to Europe than inbound so it is able to fill more of the outbound flight and the cargo loads should complement each other leading to higher fill rates and efficiencies on both journeys.

6.4.3.3 Customer Service Related Performance Enhancement

This collaboration could translate to 33% of deliveries reaching their destinations in Asia a day earlier, assuming an even distribution of freight throughout the week. In reality, the percentage increase will be lower as demand distribution across the week is not even and Company A was already running services on the busiest days. This does still offer the opportunity for higher customer satisfaction due to shorter delivery times and more importantly more consistent delivery times, with flights on all business days, delivery times will be the same whatever day the shipment is sent, which previously was not necessarily so. New faster services will be sold to customers using these routes and sales staff at both

companies in these areas are making existing and new customers aware of these new services.

Whilst growth is predicted in the general air freight market, the Far Eastern market is currently not showing signs of positive revenue growth (Chiu, 2012). A small increase in volume has been seen but companies are still struggling in this sector. Figure 6.24 illustrates the growth in the air freight revenues by geographical sector.

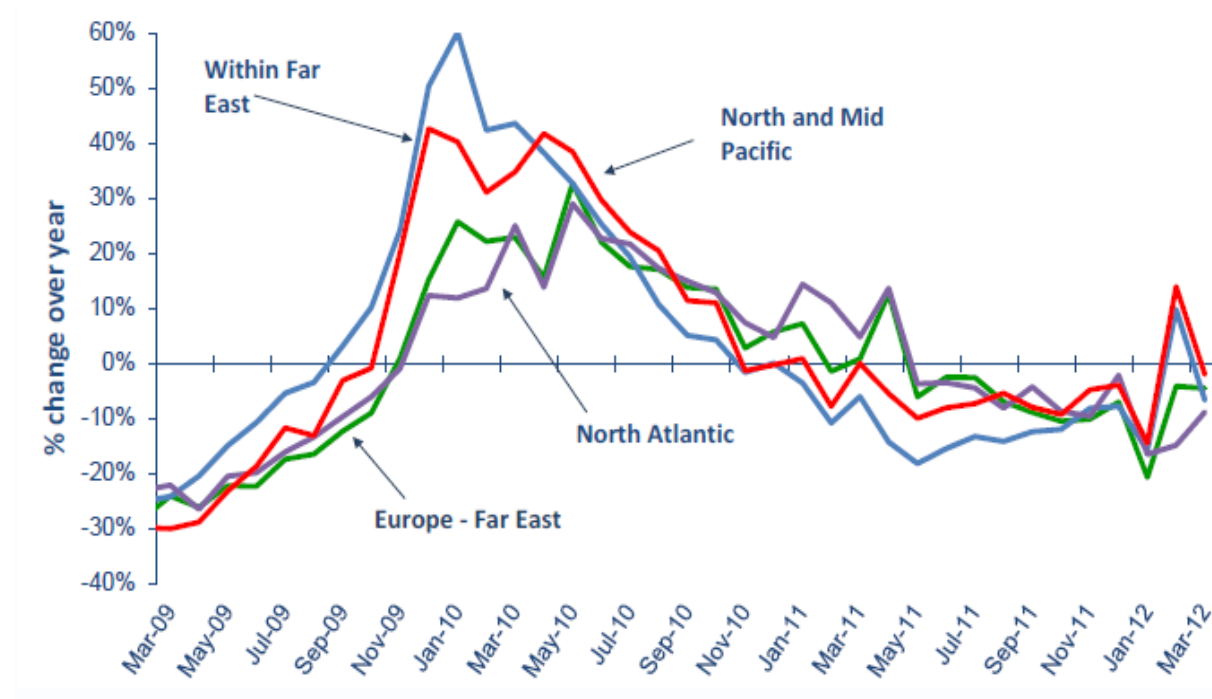


Figure 6.24: Air freight growth changes by area (IATA 2012)

It can be seen from Figure 6.24 that whilst the Europe-Asia route has seen a similar pattern of growth and decline to other routes, it saw a 25% decrease in 2011/2012, the largest decrease that had been experienced in all geographical sectors since the start of 2010.

A major selling point of Company A's services are that they can deliver quickly anywhere, whilst the air freight margins are volatile, flight sharing with another company is an excellent way for it to maintain quick regular services, without operating flights at low capacity.

6.4.3.4 Flexibility Related Performance Enhancement

Company A's CEO said that the agreement is 'an important step towards reducing its intercontinental fixed capacity. (Company A) maintains a major stake in the operating of the route, which gives us and our customers the required visibility and control' (Gibot, 2012). Company A can use this initiative to reduce fixed costs whilst still keeping control of its operations allowing it to ensure customer satisfaction. Around 95% of flights operated by Company A are on fixed schedules and the majority of extra flights put on are subcontracted and are needed due to major customers such as Apple launching new products. In these cases, aircraft are normally subcontracted from companies such as Partner A2. For this reason the majority of the capacity in its air network is currently fixed capacity.

Flexibility in capacity is important to Company A as it sees drastic weekly and monthly fluctuation in demand. It is not unusual for the demand volume on a Monday to exceed that of all the other days of the week put together. Whilst Company A wants to be able to meet that peak demand, it does not want to be operating its network with a much higher capacity than needed the rest of the week.

6.4.4 Performance Enhancements in Relation to Indicated Key Drivers

The Company A questionnaire responses indicated that Company A is using horizontal collaboration to access new markets, reduce costs, reduce procurement costs, enhance customer service, demand fluctuations and reduce carbon emissions. This case has shown enhancements in the following areas.

- Reducing costs, whilst this has been considered to be a major benefit of the collaborations Company A has been involved in, the magnitude of cost reductions have been difficult to quantify, as the interviewee at Company A was unable to find substantial quantitative information relating to cost reductions gained from horizontal

collaboration. Horizontal collaboration has allowed it to reduce its aircraft costs which account for around 25% of its total expenditure on property and equipment. This is key to Company A's medium term goals as it was aiming to cut aircraft costs by 150 million Euros by 2011.

- Easier response to demand fluctuations, Company A's motivation in the aircraft sharing collaborations was to reduce fixed capacity in an attempt to allow for easier response to demand fluctuation.
- Reduce carbon emissions, in 2011 Company A's overall CO₂ emissions according to the Greenhouse Gas Protocol were 2747ktonnes up 28ktonnes on the previous year, however, its CO₂ emissions due to flights fell by 78ktonnes whilst its CO₂ emissions due to road transport only increased by 2ktonnes, suggesting Company A is managing to cut its carbon emissions from its core processes and horizontal collaboration projects such as aircraft sharing will have contributed to this reduction.

6.5 Case Study 4

This case study concerns Company C and its shared services partnership with Partner C1. This case was carried out using the case study protocol described previously and involved two interviews with the Managing Director of the company, the analysis of a number of company documents and procedures provided by the company and a set of follow up questions answered by e-mail.

6.5.1 Introduction to Company C

Company C is a freight forwarding company predominantly dealing with temperature-controlled freight. It aims to offer one-stop solutions where it brings the whole supply chain process under one roof, providing it with the opportunity to streamline customers' logistics and through this streamlining Company C is able to offer its customers time and cost savings.

Company C's customers are predominantly suppliers to UK and Irish supermarket groups. Company C offers a full range of logistics solutions to these companies including transportation of its goods, return delivery of empty pallets, warehousing and re-packaging where necessary. Customers include Aldi, Lidl, ASDA, Morrisons, Waitrose, Marks and Spencer's and Iceland. Its customers also include suppliers of these companies that produce goods such as cosmetics, foodstuffs, fast moving consumer goods and pharmaceutical products.

Through an air, sea and road network, Company C can provide an entire supply chain solution including customs clearance, inland hauling, offloading, pick and pack, groupage and full load services. Company C's main services are considered to be UK and European road freight, global air freight, global sea freight, temperature controlled multi-modal logistics, UK and Ireland warehousing, 3PL supermarket/retailer logistics, project cargo and abnormal loads and movement of hazardous cargo.

In many cases Company C provides all its clients' individual supply chain needs and deals with product transportation and warehousing from the points of origin to the point of sale. However, Company C also provides many of its supermarket group customers and its suppliers with partial services. This normally involves the transportation of damaged goods to local warehouses, sorting and repackaging services and then the transportation of any useable stock back to the Supermarket warehouse.

6.5.2 Company C's Questionnaire Responses

Company C's questionnaire responses indicated that it is a medium-sized freight forwarding company. Freight forwarders accounted for the largest portion of the respondents at 32%. Company C indicated it was collaborating with both direct competitors and potential

competitors as well as looking for additional partners to collaborate with, as did the majority of other respondents.

With regards to drivers for collaboration, those selected by the respondent from Company C were, access new markets, reduce transport costs, reduce procurement costs, enhance customer service, reduce storage costs and improve vehicle fill utilisation. These include the four most popular responses; reduce transport costs, enhance customer service, access new markets and improve vehicle fill utilisation. The reduction of storage costs and the reduction of procurement costs were less popular responses with 24% and 27% respectively. The reduction of storage costs may have been a less popular response as not all of the respondent companies offered storage and warehousing facilities, which account for a significant portion of Company C's business.

The barriers to horizontal collaboration that were indicated by Company C's questionnaire responses were lack of trust, fear of competitors accessing sensitive information on business operations, difficulty in finding partners and hard to estimate the savings of the co-operation in advance. Lack of trust and fear of competitors accessing sensitive business information were the two most popular responses and the only ones that were selected by over half the respondents. Difficulty in finding partners and difficulty estimating the savings in advance were selected by 28% and 18% of the respondents respectively.

In terms of types of collaboration taking place, Company C indicated that it was involved in the consolidation of complementary and non-complementary freight and the sharing of services. The consolidation of complementary freight and the sharing of services were the most popular responses, but the consolidation of non-complementary freight was a less popular response with only 24% of respondents indicating they were involved in this.

With regard to resources shared Company C indicated that it was sharing a wider range of resources than the majority of respondents. These included truckloads, containers, pallets, warehouses (belonging to its company and its partners) and suppliers. ‘Truckloads’ and ‘warehouses’ were the two most popular responses to this question with 62% and 55% respectively. ‘Suppliers’ was the most uncommon of Company C’s responses with only 24% of respondents indicating that this was something they shared.

Company C indicated that it had been involved in horizontal collaboration for 1-2 years, which was significantly less than the majority of respondents. The interviewee at Company C explained that it had moved from sub-contracting relationships to horizontal partnerships at that time. Company C also has fewer partners than the majority of companies, with only 2-3 with 53% indicating they had 4 or more partners.

Company C indicated that, in terms of geographical location, it had a wider range of partners than the majority of respondent companies. With partners located in the UK, Europe and outside of Europe, the only area Company C indicated it did not have partners was locally. Only around 29% of respondents indicated they were collaborating with companies in the same region and 30% indicated they were collaborating with companies outside of Europe.

6.5.3 Rationale for this Case Study

Company C was chosen for a number of reasons. Firstly Company C’s responses illustrated that it was involved in a number of different types of collaboration suggesting that it would be able to provide insight into these different types of collaboration.

An additional reason for choosing to start with Company C was that many of its responses matched the typical responses to the questionnaire. As discussed in the previous section, it is a medium-sized freight forwarder that is involved in both the sharing of services and consolidation of freight. Company C’s responses generally agreed with the most popular

drivers and barriers to horizontal collaboration. Company C did indicate that it had been involved in horizontal collaboration for less time than the average respondent; however, in terms of gaining information on the performance enhancements, it was thought that if horizontal collaboration had been introduced more recently it might be easier to gain information and quantify exactly how horizontal collaboration had enhanced the company's performance.

6.5.4 Company C's Network Structure

To allow Company C to provide a one-stop logistics solution, it utilises a large network, which it accesses through subcontractor and collaboration agreements. Its network can be broken down into a number of areas: road freight, airfreight, sea freight and warehousing.

Company C's road freight network allows it to deliver to the majority of European countries.

Figure 6.25 depicts Company C's network coverage.

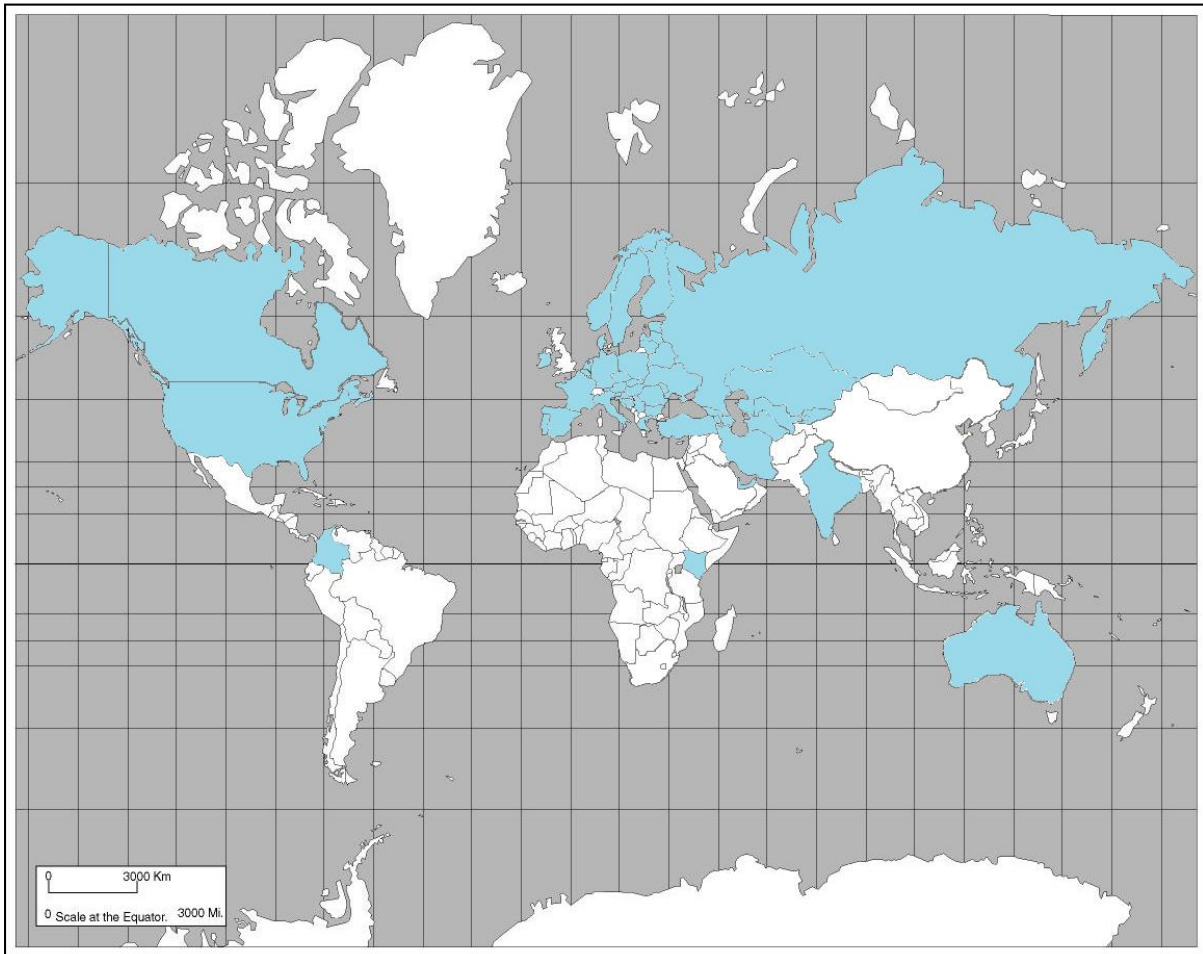


Figure 6.25: The Company C Network (information collated from Company C’s network)

Due to its focus on road freight the majority of countries that Company C delivers to are within Europe, although through sea and air, routes are available to other parts of the world. Figure 6.25 shows the countries that Company C typically delivers to but it does try and offer services to other countries when clients require it.

Countries	Transit time (days)	Partial load departures	Full load departures
Belgium, France, Germany, Holland, Ireland, Liechtenstein, Luxembourg	2/3	Daily	Daily
Andorra, Finland, Italy, Monaco, Spain, Sweden	3/4	Daily	Daily
Austria, Denmark, Norway, Portugal	3/4	Tue/Wed/Fri	Daily
Czech Republic, Slovakia	3/4	Wed/Fri	Daily

Hungary	3/4	Wed/Fri	Once a fortnight
Poland	4/5	Wed/Fri	Once a month
Croatia, Estonia, Latvia, Lithuania, Moldova, Slovenia	4/5	Fri	Once a fortnight
Bosnia, Romania, Serbia	6/8	Fri	Once a fortnight
Greece	9/10	Wed/Fri	Once a fortnight
Russia, Turkey	9/10	Wed/Fri	Once every 3 weeks
Belarus, Ukraine	9/10	Fri	Once a fortnight
Bulgaria	9/10	Fri	Once every 3 weeks
Armenia, Azerbaijan, Dagestan, Georgia, Iran, Kazakhstan, Tajikistan, Turkmenistan, Uzbekistan	12/16	Twice monthly	On application

Table 6.18: Road freight deliveries (collated from Company C, 2012)

It can be seen from Table 6.18 that Company C offers road freight services to most of Europe and West Asia. Company C has tailored its offerings towards part load services for companies shipping small volumes of freight to a particular destination and therefore offers more frequent departures for partial loads than for full loads. Company C offers more frequent services to the nearer European countries but still manages to offer weekly services to the West Asian countries.

In terms of road freight, Company C classifies its vehicles for European road freight into two categories. The first of these deals with urgent deliveries and includes Sprinter, Luton Box & Dropside vans; these can carry up to 4 pallets or 1300kg (Company C, 2012.) The second set are for non-urgent groupage or full load orders and include 13.6m Tautliners, Euroliners, Tilts, Temperature Controlled Box Vans, Draw Bars and Flat Trailers (Company C, 2012.)

In terms of air freight, Company C operates out of both London Heathrow and Manchester to a large range of global destinations. Services around air freight cargoes include collection and

delivery services, duty deferment, customs clearance, packing services, supervised loading and discharge, cargo shipment planning and export documentation.

With regard to sea freight, through its cooperation with major shipping lines such as P&O, Company C can provide worldwide import and export services for containerised and non-containerised cargoes.

6.5.5 Case Description –Backhauling with Transportes Caliche

The case study undertaken at Company C involved back loading of vehicles. Company C runs a route to Spain for part loads on a daily basis; Company C can normally fill the outward journey but struggles to fill the return leg, due to a lack of customer base in Spain. For this reason it began looking for a Spanish company to partner with, with the hope it would be able to find a Spanish company with the reverse challenge.

It is now partnering with Partner C1 which is a Spanish logistics and transport company. Partner C1 aims to provide tailor-made supply chain solutions to its customers and deals mainly in part loads. Partner C1 concentrates mainly on the Southern European market, but has a regular route from Spain to the UK, where it tends to have very little, if any freight to fill the return journey. Partner C1 is very open to horizontal collaboration to the extent that it has an open invitation on its website asking for potential partners and allowing potential partners to contact it, as shown in Figure 6.26.



Figure 6.26: Partner C1, partner advert (Partner C1, 2012)

Not only is this message repeated on its website but it is also available on the foreign language pages, so is available on Spanish, English and French language pages to increase the chances of finding potential partners.

Both companies have found the inability to fill the return leg of the journey to be an increased problem as the general freight levels on this route have dropped due to the economic crisis. Figures 6.27-6.30 will attempt to quantify the reduction in freight being exported to and imported from Spain to the UK.

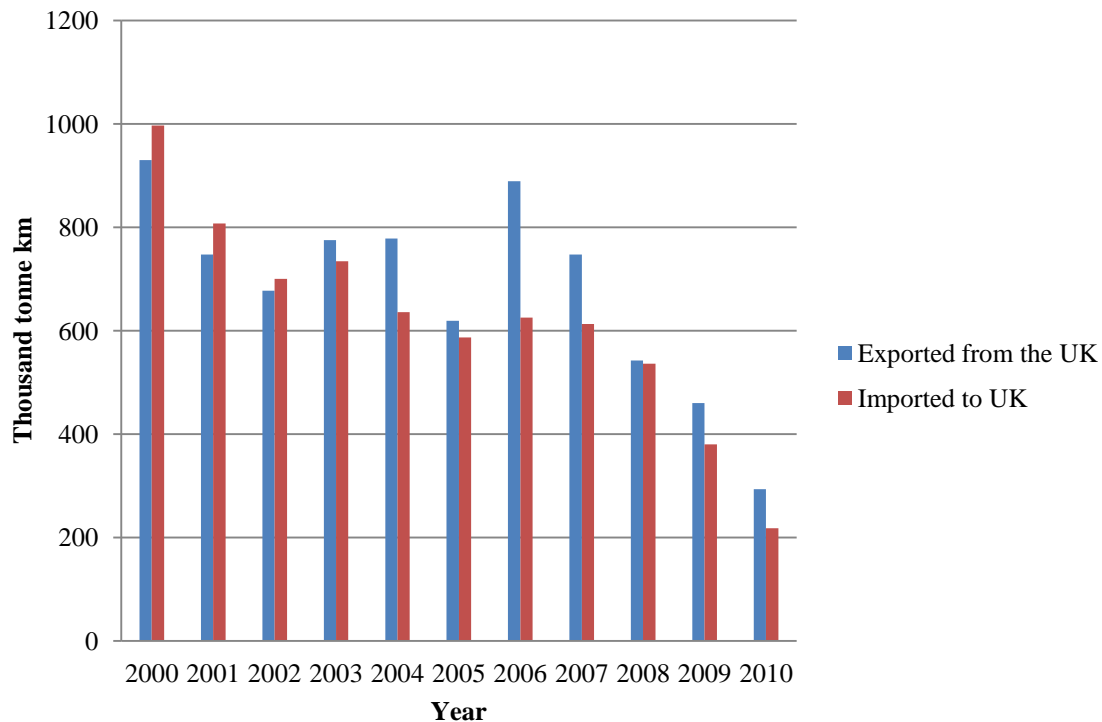


Figure 6.27: UK Hauliers import and export figures for UK to Spain (Department for Transport, 2010a and 2010b)

Figure 6.27 shows a significant drop in the level of freight UK hauliers were transporting to and from Spain, with the total freight being imported and exported dropping by 75% between 2000 and 2010 and the general trend is still downwards. Figure 6.28 shows the percentage of the total non-domestic road freight transported by UK-based hauliers accounted for by import and export movements to Spain.

Figure 6.27 also shows an imbalance between the road freight exported from the UK and the road freight imported, suggesting that many companies will have problems filling the vehicles returning from Spain. The graph also shows that the imbalance has shifted over the previous decade, in 2000 and 2001 more freight was being imported from Spain to the UK but from 2003 the UK has exported more freight to Spain than has been exported from Spain to the UK.

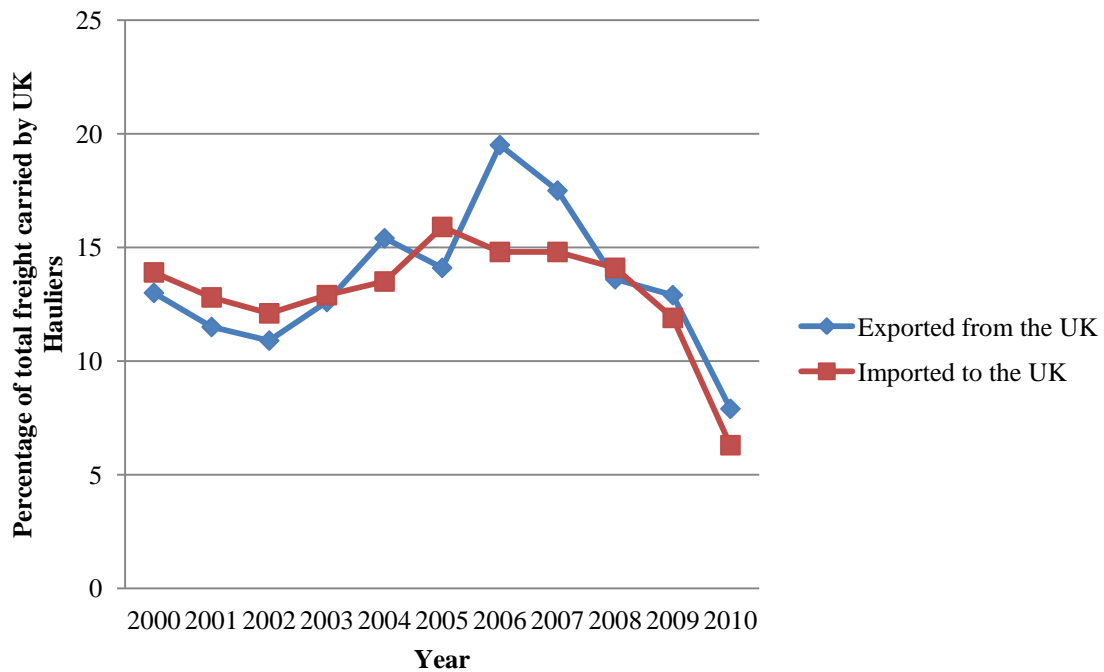


Figure 6.28: Percentage of total freight carried by UK Hauliers accounted for by Spanish imports and exports to the UK

It can be seen that the importance of the UK – Spain road freight route had dropped drastically by 2010. This implies the levels of freight on the UK – Spain route have continued to fall, whilst, other routes have begun to recover.

Figures 6.29 and 6.30 consider the same figures but for hauliers based in Spain rather than in the UK.

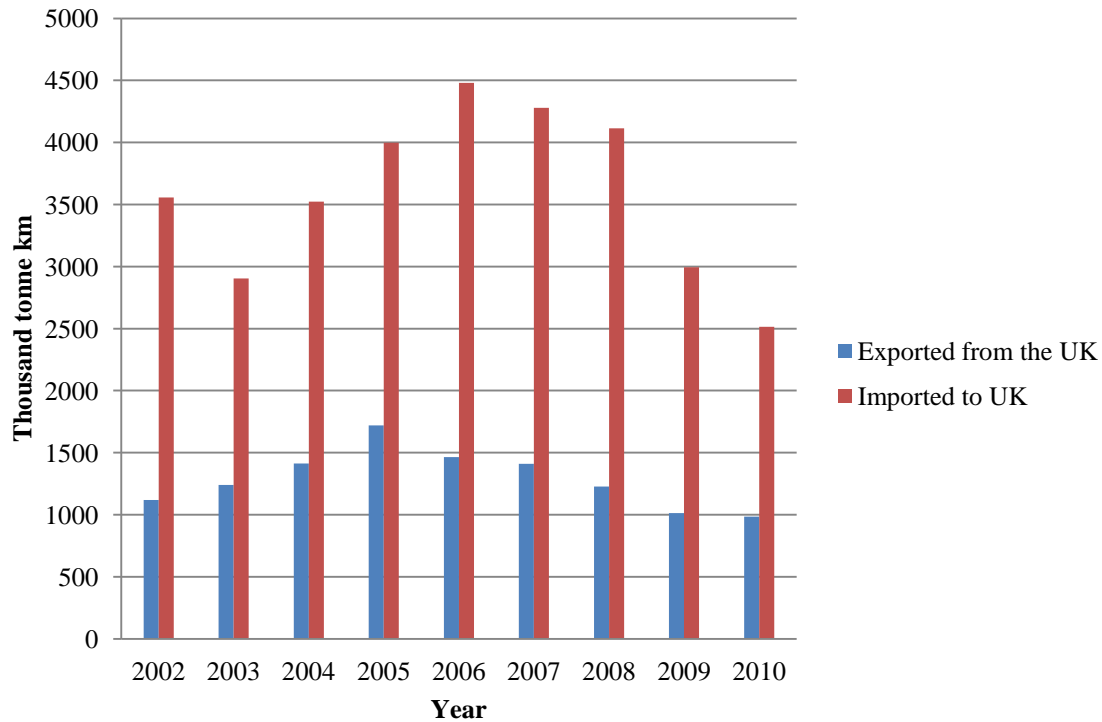


Figure 6.29: Spanish Hauliers import and export figures for UK to Spain (Department for Transport, 2010c and 2010d)

Figure 6.29 shows a severe imbalance between the freight exported and imported from the UK by Spanish hauliers. With the import levels to the UK being at least double the export freight in each year, with the highest difference being seen in 2002 where import tonnes were 168.5% of exports, this has fallen slightly but in 2012 imports were still 160.8% of the exports. This means that Spanish hauliers will generally be operating their return journeys at less than half the fill rate of the journey to the UK, which given that the outward journey is unlikely to have been operated at full capacity. A report collated by the European Commission did show that Spanish hauliers had on average a higher international road freight load factor at 17.5% compared to the EU average of 16% and the UK average of only 10.5% (EU, 2010). However, on this route, this above average load factor is unlikely to be seen due to the imbalance shown by Figure 6.29.

Figure 6.29, when compared to Figure 6.27, suggests that Spanish hauliers are being more adversely affected by the imbalance in road freight between Spain and the UK. This suggests that UK firms wanting to partner with Spanish firms may find it easier to find partners than Spanish companies looking for UK based partners.

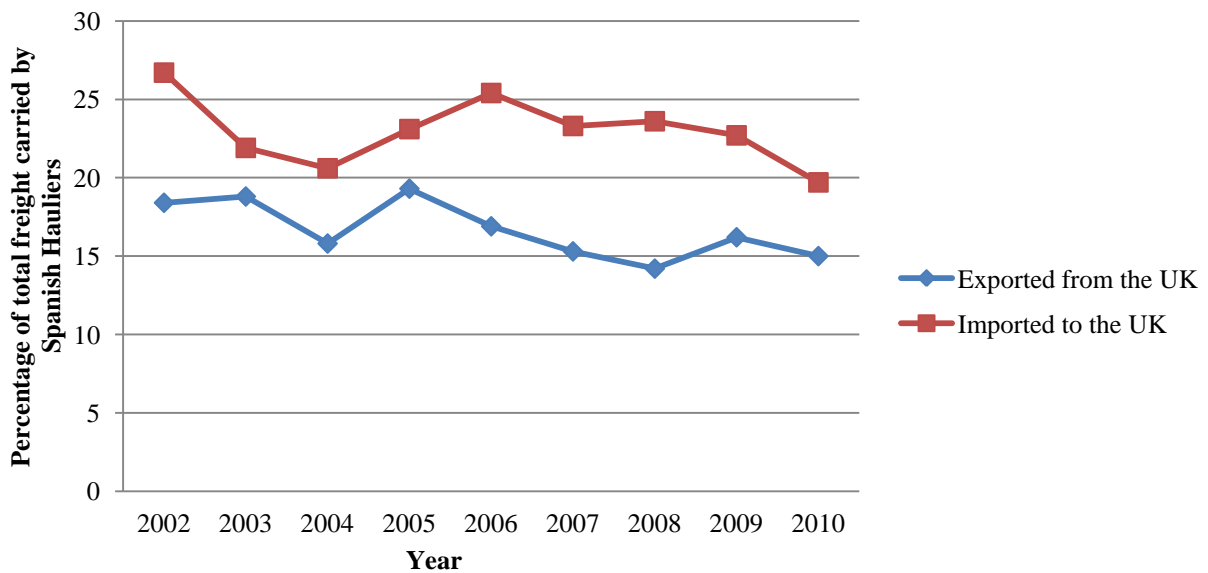


Figure 6.30: Percentage of total freight carried by Spanish Hauliers accounted for by Spanish imports and exports to the UK

Figure 6.30 does not show the same almost continuous downward trend that Figure 6.27 showed suggesting freight levels on other routes also dropped in the first part of the last decade, however, 2008-2010 does show a steep downward trend. Figure 6.30 shows that the Spain-UK route is more important to Spanish hauliers than UK-based hauliers with 15% and 19.7% of the total exported freight and imported freight being attributed to the UK-Spain route compared to 7.3% and 6.3% of UK haulier's road freight business. The figure for Spanish hauliers has seen less of a declining trend suggesting that although freight levels on this route have dropped they have only decreased in line with the general decrease in export and import road freight that Spanish hauliers are seeing.

These declining freight volumes are making this route more difficult to operate profitably whilst still offering regular services and by collaborating and sharing this service both companies stand to benefit.

From 2012 Partner C1 has allowed Company C to use its empty space on the return journeys. Company C fills the vehicle from the UK to Spain and Partner C1 fills it from Spain to the UK.

Company C receives its own orders, plans the loads for the Partner C1 vehicles and then sends the information to Partner C1 so it can instruct the drivers accordingly. This collaboration does not simply involve Partner C1 delivering Company C freight, Company C is collaborating with Partner C on a higher level with companies sharing forecasts, planning information and collaborating to plan routes. Partner C1 collects Company C's shipments from UK manufacturers and delivering them direct to end users in Spain. This again suggests a deeper form of collaboration as Company C is trusting Partner C1 with services that involve interaction with the customer.

6.5.6 Performance Enhancements of Backhauling

In this case, the drivers for involvement in this form of horizontal collaboration were cost based. As was expected the main performance enhancements gained from backhauling were cost based although some efficiency, flexibility and customer service-based performance enhancements were seen.

6.5.6.1 Cost Related Performance Enhancements

The service provided by Partner C1 is costing Company C £1200 for each full truckload; Company C was previously earning an average revenue on the service of £1400 which meant that in most cases if the customer only needed transportation services and did not require warehousing or value-added services then Company C made a loss. In the current

environment, Company C is finding that it has to offer pure transport services at a loss, as many companies are offering transport of goods at a loss in the hope of then gaining warehousing and added service contracts with the companies allowing them to make money off these services. An example of this that Company C has experienced is in UK transport from London to the Midlands, in terms of hiring the truck and the driver and the petrol costs this will cost a logistics company around £250. However, Company C has been undercut in offering this service by companies charging £150.

The cost savings that Company C is obtaining from working with Partner C1 allows it to continue to offer this service at a price that will make it a profit without having to rely on customers using its other services.

Company C has moved to making an average profit of £200 per daily service to Spain in contrast to the small loss it was previously making on this service. Over the course of a week, this adds up to an additional £1400 profit a week.

6.5.6.2 Efficiency-Related Performance Enhancement

The cost savings discussed above are derived from an efficiency enhancement. By working together, Company C and Partner C1 are able to fill the trailers for both legs of the journey, reducing the empty running miles. Empty running miles are a serious problem for the logistics industry as is illustrated in Table 6.19.

Year	Percentage of HGV's Empty Running
2009	29%
2010	28%
2011	29%

Table 6.19: Empty running percentages (Freight Transportation Association, 2012a)

Although it appears from Table 6.19 that the percentage of empty running has not increased with the decrease in freight levels, this is still a considerable problem for logistics companies particularly when considered in conjunction with the increase in road haulage costs, which are shown in Figure 6.31.

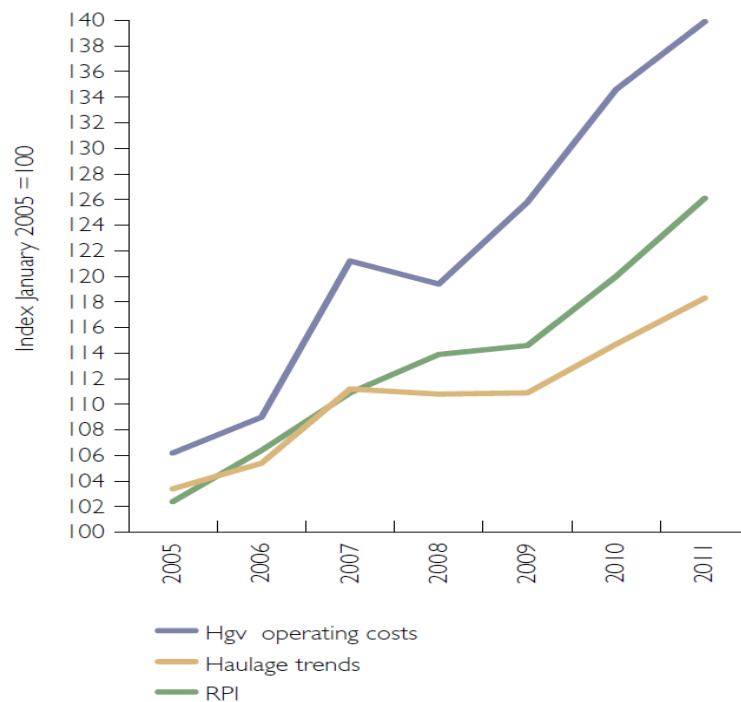


Figure 6.31: HGV operating costs (Freight Transportation Association, 2012b)

Figure 6.31 shows a steep increase in the operating costs for HGV's which have not been matched by the trend in rates being charged to customers. This has led to a further decrease in the margins in the logistics industry, meaning it is more important than ever for companies to try and reduce empty running miles.

This collaboration means that the entire journey is now value-adding for the logistics companies, with no or very little mileage being undertaken simply to return the trailer to its starting point. There will in most cases be some empty running miles in the UK and Spain, which will be made up of the journeys from the customer in the UK to the supplier they are picking up from in the UK and the corresponding journeys in Spain.

In addition to reducing the empty running miles, this collaboration has allowed Company C and Partner C1 to increase their fill rate. The industry average fill rate for road hauliers is 55% (Freight Transportation Association, 2012b). Company C and Partner C1 were both seeing averages below this for the majority of trips when both legs of the trip were taken into account which was further squeezing profit margin. Since the beginning of this collaboration almost 100% of trips on this route have had a fill rate of 55% or over.

6.5.6.3 Customer-Service Related Performance Enhancement

Company C has not decided at this time which level of the cost savings it is achieving through this collaboration to pass onto its customers but was sure that at some level this cost reduction would be passed on. The managers feel that this will allow them to develop closer, more trusting relationships with customers. If its customers understand that Company C is willing to pass on cost reductions rather than keeping the benefits for itself, they will believe that Company C is working with them to find the best solutions for them and this may, in turn, lead to them gaining further custom from its existing customer base.

6.5.6.4 Flexibility-Related Performance Enhancement

Although flexibility was not a major driver for involvement in backhauling, it does increase Company C's flexibility as the resources used in this collaboration belong to Partner C1's subcontractor. This means that the resources that were being used previously by Company C to undertake these journeys are now free, giving Company C extra capacity to allow it to undertake other orders, increasing its flexibility.

Despite the above point, there is an implied flexibility decrease associated with a collaboration project of this sort. At the moment Company C runs daily departures for both full loads and part loads and can increase its capacity through sub-contracting loads or taking vehicles from other routes if this route becomes particularly busy. This is more difficult to do

when working with shared vehicles. Partner C1 may not have the demand peaks at the same time and since the vehicles being used in this collaboration belong to Partner C1, Company C will not have the power to insist that Partner C1 sends a vehicle when it does not have the freight to fill it; this would mean Company C would either have to refuse orders that go over the fixed capacity provided to them by Partner C1 or take capacity off other routes or subcontract. Company C does not see obtaining extra capacity when needed as a problem, the only issue that it believes should be kept in mind is that if it has to do this, it will not see the cost savings provided by the collaboration and therefore if it reduces its prices for this route too much it may find it is running too many journeys at a loss.

6.5.7 Performance Enhancements in Relation to indicated Key Drivers

It has been seen that the driver most closely connected with this project is the improvement of vehicle fill utilisation, which, as previously, mentioned is a major problem in many sectors of the logistics industry. This collaboration has allowed Company C to improve its vehicle fill utilisation on this route to above the industry average. This has, in turn, reduced the costs on this route through the increase in revenue that is seen through this improved fill rate.

The other drivers indicated in Company C's questionnaire responses were accessing new markets, reduce procurement cost, enhance customer services and reduce storage costs. To a certain extent an improvement in customer service could be seen in this case as the cost reductions could be passed onto the customer.

In terms of accessing new markets, there is some aspect of this seen in this case, although the new customers for the service will not be Company C's, the efficiency improvements have been gained through the increased customer base utilising the service.

The reduction of procurement costs and the reduction of storage costs have not been addressed through this particular collaboration, Company C believes that they are obtainable

through other forms of collaboration and that each horizontal collaboration project does not have to produce benefits that match all of the drivers.

6.6 Case Study 5

This case study concerns Company A, which was described in case 1 and its collaboration with the Post Office in Country A, which is a joint venture partnership. As this case was undertaken at the same company as case study 1 no further introduction to the company, network description or discussion of the questionnaire responses are provided, as these have already been discussed.

6.6.1 Rationale for this Case Study

As stated previously, cases with this company allowed for horizontal collaboration amongst large multinational companies to be studied in comparison to other case studies that have focused on much smaller companies. Company A was also one of only 13% of respondents that has been involved in Joint Ventures allowing for this case, case 5, to be undertaken to provide an insight to how joint ventures, an uncommon form of collaboration in the logistics industry, can be beneficial.

6.6.2 Case Description

This case considers a joint venture that Company A is involved in identified as Joint Venture A1. Joint Venture A1 is a 50:50 joint venture between Company A and the Post Office in Country A, that began in 2000 (Company A's Holding Company, 2011b). This allows Company A to access the Post Office network in Country A as well as its own global air network and European road network. Company A acquires access to both Country A's Post offices and technology whilst the Post Office in Country A has the opportunity to connect to Company A in mail, express and logistics (Malcolm-Campbell, 2002). In this joint venture

the profit is split equally between the two companies after tax. Service prices are re-negotiated yearly.

This joint venture solely deals with shipments being delivered internationally from Country A; it does not include shipments being delivered domestically within Country A or shipments being delivered into Country A. Table 6.20 provides some key information concerning the joint venture.

Employees	650
Headquarters	1
Offices	3
Satellite Stations	8
Air hub	1
Road Hub	1
Total storage space	14800m ³
Vehicles	150
Items carried per year	3.1 million

Table 6.20: Key information (Joint Venture A1, 2010)

Through Joint Venture A1, Company A is able to offer a wide range of standard services to the Swiss market; these are summed up in Table 6.21.

Service	Brief Description
Same day	Pickup within 60 minutes for delivery to key business districts or individual sites that day with no height or weight restrictions, inclusive of customs formalities.
Next business day	Pickup before the end of business that day, delivery next workday or next possible workday.
9.00 Express	Guaranteed in many large cities worldwide, delivery before 0900 the next workday or next possible workday. Pickup before close of business day and delivery of shipments up to 500kg in 40 countries.
10.00 Express	Guaranteed in many large cities worldwide, delivery before 1000 the next workday or next possible workday. Pickup before close of

	business day and delivery of shipments up to 500kg in 60 countries.
12.00 Express	Guaranteed in many large cities worldwide, delivery before 1200 the next workday or next possible workday. Pickup before close of business day and delivery of shipments up to 500kg in 60 countries.
Express	Shipment picked up on a given day and delivered on a definite day within 2-5 days. Delivery in over 200 countries, maximum shipment 500kg.
Economy Express	Day definite service for up to 7000kg for delivery in Europe and 500kg for the rest of the world. Available for deliveries in 200+ countries.
Urgent	International courier service offered at post offices for urgent deliveries the next possible business day. 30kg limit for over the counter and 500kg for collection.
Freight	Air and road freight services for any size, shape or weight of shipment to 200+ countries including heavy, valuable and dangerous shipments. Air freight provides a door to door service including import and export formalities. Road provides immediate or scheduled pick up, charter of suitable vehicle and import export formalities, part or full loads accepted and real time tracking available.
Packaging	Envelopes, padded envelopes and tubes for documents, shipping boxes for 2, 5, 8, 12kg and bottle packaging for liquids such as wine.
Insurance	Insurance up to 25000 Euros for parcels, up to 500 Euros for documents.

Table 6.21: Joint Venture A1 services adapted from (Company A's Holding Company, 2011b)

Through this joint venture, Company A is able to provide the same services in Country A as it does in the UK where it has a full presence. If the joint venture was not in place Company A would still be able to service this market, however, the lead times would be significantly longer, which for a business which primarily deals with express shipments would make its services in Country A uncompetitive to its market. Also, without the co-operation of the Post

Office, Country A's services such as the urgent service would have to be sold in a different manner.

As in other countries Company A offers packages of services aimed at specific industries. In Country A, Joint Venture A1 targets the following industries.

- Automotive – Joint Venture A1 promises to offer a number of innovative and flexible solutions to support an automotive company's strategies now and in the future. It allows for the support network of Company A's automotive specific teams in a number of countries to be utilised to find multi-national solutions where applicable. Partners in the automotive industry include BMW, Daimler Chrysler, Fiat, Ford and General Motors (Supply Chain Brain, 2004). In the US, Automotive Partner A's partnership with Company A began with basic inbound delivery at one plant in 2003 and now includes inbound supply chain management and management of finished parts from suppliers into its parts distribution network (Inbound Logistics, 2004).
- Manufacturing – these packages are aimed at manufacturers in the power generation, construction and engineering industries and provide an efficient and reliable logistics network for service parts. The packages are also targeted at providing efficient supply chains where the geographic customer base has increased or where component manufacturing has been forced to move to low-cost countries.
- Telecommunications – Joint Venture A1 aims, through its flexible network, to manage the turbulent capacity requirements needed by this industry, whilst, keeping shipping cost competitive and ensuring reliable transit times including delivering to what it describes as 'difficult markets' in developing countries and services including deliveries of individual samples to full vehicle load.

- Electronics – provides global shipping and value-added services to manufacturers and distributors of personal and professional electronic equipment and components including fragile or sensitive loads.
- Computing – Joint Venture A1 offers an end-to-end delivery model focusing on lowering costs whilst bringing products to the market as quickly as possible. This is facilitated through direct links on popular routes such as Shanghai to Moscow for delivery to Europe and the Integrated Direct Express (IDE) cross docks in Holland, Asia, Australia and the Middle East allowing for quick integration of incoming air freight into the Joint Venture A1 network. Company A's partners in this area include Apple, where Company A delivers products bought online in countries including Hong Kong, Switzerland and the UK.
- Health Care – these packages provide shipping and value added services to clinical research companies and producers of medical equipment.
- Textiles and fashion – these services deal with everything from high fashion products to protective garments such as surgical masks and provides door-to-door quick delivery with full track and trace services.

Some elements of the services provided to these industries are common across a number of industries, as shown in Table 6.22. Textiles and fashion are omitted from this table as none of the elements are used in this market.

	Auto	Industry	Telecoms	Electronics	Computer	Health
Automotive control centres	X					
After-market parts express	X					
Clinical research						X
Delivery + collections plus			X	X	X	
Inbound materials management	X	X				
Integrated direct express		X	X	X	X	X
Med Tech						X
Merge in transit	X	X	X	X		X
Time critical aftermarket	X	X	X	X	X	
Returns Express	X	X	X	X	X	X
Value added service centres	X	X	X	X	X	X

Table 6.22: Industry service profile

The elements of Company A's services shown in Table 6.22 are explained below.

- Automotive control services – represents a one-stop shop that is available in 18 countries worldwide and provides order management services for both input and output flow of goods. This service gives dedicated customer service, administrative and operational support for door-to-door delivery of automotive components.
- After-market parts express – this service to the automotive industry involves the delivery of urgent spare parts from distribution centres to dealers and warehouses. This service often involves delivery before 0700 the following morning and is designed to minimise warehousing and inventory costs whilst still offering quick delivery times.

- Clinical research – this has been developed to serve a growing trend of pharmaceutical companies outsourcing clinical trials to expand its pool of eligible patients. Company A offers logistics solutions for the distribution of drugs for these trials.
- Delivery and collection plus – this service includes the delivery of products to end customers, as well as value-added services such as repackaging, replacing and installing as well as the appropriate administrative support for these functions including serial number verification and return instructions provision.
- Inbound materials management – this is aimed at providing emergency inbound materials management to avoid production stoppage or retrofits. Company A can handle support functions around this such as acceptance of order requests, availability checking, development of transport solutions and the execution and monitoring of the delivery.
- Integrated direct express – involves the consolidation of a customer’s shipments at a designated air freight hub to allow a single customs clearance procedure to be undertaken and then the shipment is split by destination address and delivered within the country/countries required. This enables customers to gain savings whilst keeping short lead times through the use of global sourcing.
- Med Tech – increased pressure on national healthcare budgets in many countries has led to a demand for a more flexible supply chain, with many products needing to be delivered directly to a specific person at a specific hospital. Company A transports medical products ranging from bandages, to life sustaining implants and diagnostic imaging equipments. This involves 24 hour operations at the highest service level including specialist courier transport for end mile delivery, and packaging solutions for temperature sensitive or moisture sensitive shipments

- Merge in transit – this allows companies to manage worldwide coordination of multiple component orders to a customer, resulting in a single shipment being made to the customer. Once the customer order is placed suppliers from all over the world send parts to a value-added service centre and components are stored until all the necessary parts are available, the parts will then be sent out to the customer in one shipment. This can allow companies to reduce inventory carrying costs and transport costs whilst maintaining global coverage and fast transit times.
- Time critical aftermarket – Company A allows manufacturers to store small inventories of critical parts across its global storage network allowing companies to provide critical parts within 2 hours across the globe. This allows for inventory carrying costs to be reduced and warehousing capital to be reduced.
- Returns Express – this service offers customers support across the whole returns process including repairs, replacement, recall and reuse. Company A can offer additional services in relation to this including central order receipt, product storage, management of production call backs, product evaluation and consolidation and dispatch.
- Value added service centres – these provide services including but not limited to, installation, order processing, quality control and pick and pack. This allows companies to reduce their inventory holding costs and to utilise a global network of centres to allow final order configuration to be undertaken close to the customer.

This is not the only collaboration of its kind publicised by the companies involved. There is a similar agreement in place between Competitor A1 and the Post Office in Country B, whereby Competitor A1's international deliveries are sold at the Post Office counters in Country B and then delivered outside of the country through Competitor A1 (Competitor A1,

2010). This was undertaken to allow both companies to benefit from Country B's (at the time) increasing export market, as shown in Figure 6.32.

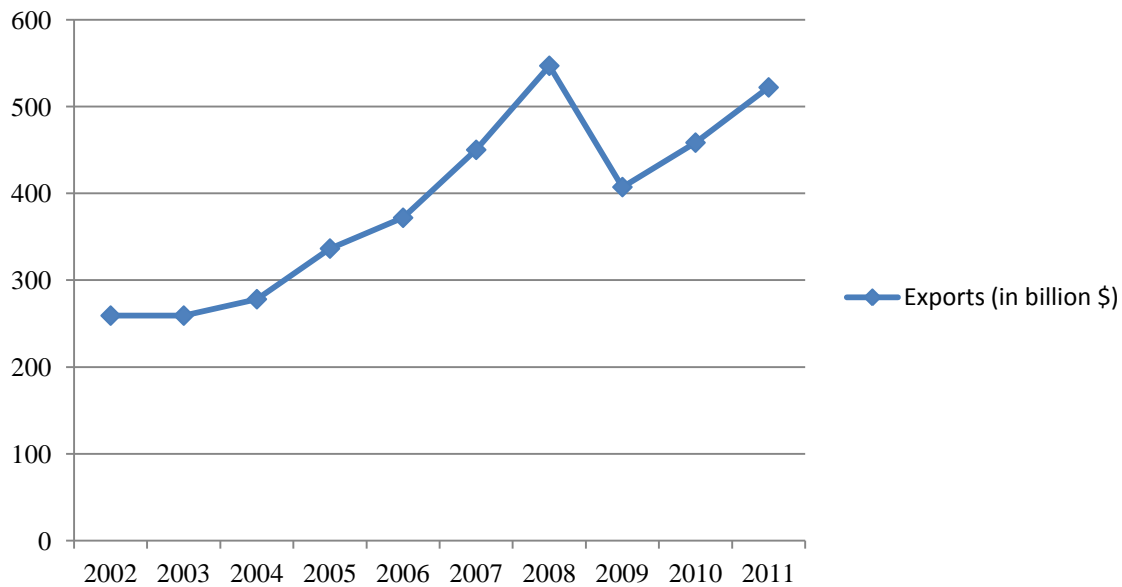


Figure 6.32: Country B's annual export values (Central Intelligence Agency, 2012)

The joint venture between Competitor A1 and the Post Office in Country B allows Competitor A1 products to be sold in 14000 post offices in Country B (Post Office in Country B, 2006). In comparison, Company A's agreement with the Post Office in Country A gives them access to 2278 post offices (Company A's Holding Company 2011b). However, looking at 2011's figures for Express Exports for both companies shows that Company A benefitted from revenue from an extra 2.6 million items that it handled from Country A through Joint Venture A1 (Company A's Holding Company, 2011b) whereas Competitor A1 benefitted from 1.66 million items handled in Country B through its joint venture with the Post Office in Country B (Post Office in Country B, 2011).

Comparing the environments these collaborations are in, the Joint Venture A1's market decreased by 3.2% in 2009 and then increased by 6% in 2010 and is predicted to grow in value by 3.8% annually in 2010-2015 and in volume by 3.5% annually (Datamonitor, 2011a). The Competitor A1 – Post Office Joint Venture market decreased by 10% in 2009 and then

increased by 6% in 2010 and is predicted to grow in value by 3.3% annually in 2010-2015 and in volume by 3.7% annually (Datamonitor, 2011b). This suggests that a Joint Venture in Country A in the express market may prove to be more successful to a company than one in Country B. However, it is not possible to compare these directly and suggests Company A made a better choice than Competitor A1 as Company A already has its own operations in Country B, which despite the economic downturn, saw double digit revenue growth in 2010 which prompted Company A to expand its facilities (Company A's website dedicated to Country B, 2011). Competitor A1 also has its own facilities in Country A. Whilst these figures cannot be used in direct comparison they do give an idea of the benefits that have been seen from similar collaborations.

6.6.3 Network Structure of Joint Venture A1

Joint Venture A1 utilises parts of both Company A and the Post Office in Country A's networks. Figure 6.35 shows which aspects of Company A and the Post Office's networks are used in the Joint Venture A1's supply chain.

Operational Flow

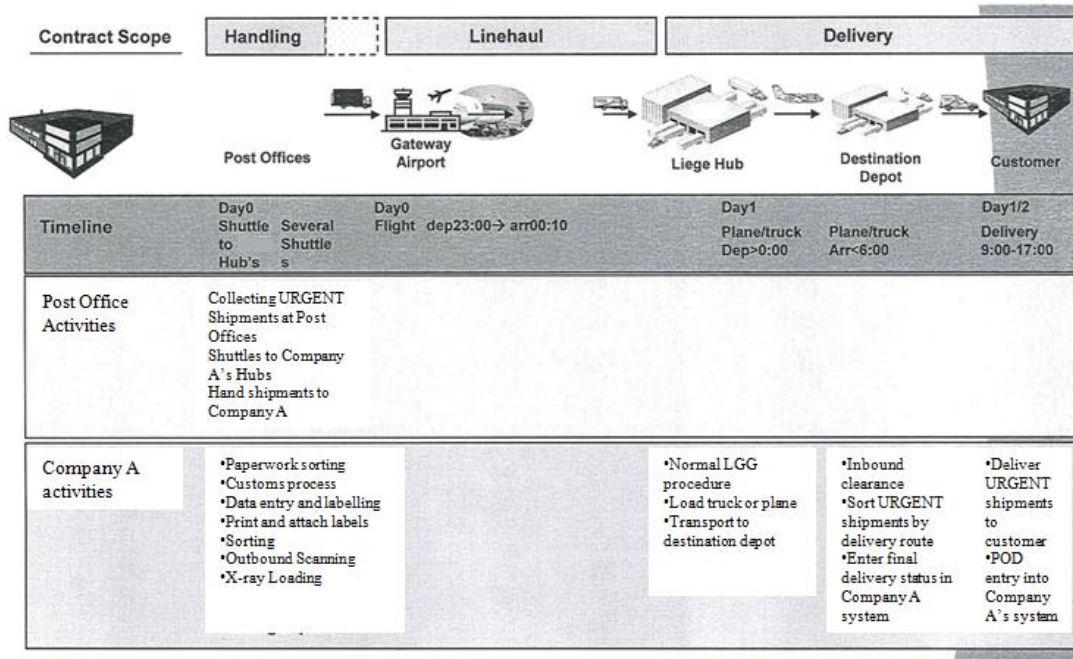


Figure 6.33: Operational flow for Joint Venture A1 (Company A, 2012)

The Joint Venture A1 supply chain starts with shipments being either taken to the post office or in the case of larger business-to-business deliveries, the order is placed by phone or through Company A's on-line system and the shipment is then picked up by the Post Office or one of its subcontractors. The shipments are then consolidated by Company A and its subcontractors at the air hub and are flown to the Liege hub where they enter the normal Company A supply chain.

In this case the Post Office provides the sales teams and sales locations as well as local transport and Company A provides the rest of the network. Company A regards this as being of benefit to it as allows them to access new customers, particularly small customers meaning Company A is less dependent on a small number of major accounts.

6.6.4 Performance Enhancement of Joint Venture A1

Table 6.23 shows the performance data, available from Company A's annual report that is relevant to Joint Venture A1. This shows a positive trend between 2009-2011.

(in millions of Euros)	2011	2010	2009
Noncurrent assets	6	6	5
Current assets	47	36	24
Equity	23	17	15
Noncurrent liabilities	4	4	1
Current liabilities	26	21	13
Net sales	90	78	58
Operating income	16	10	7
Profit attributable to shareholders	12	7	6
Net cash provided by operating activities	15	11	8
Net cash used in investing activities	(1)	(1)	(2)
Net cash used in financing	(13)	(8)	(7)
Changes in cash and cash equivalents	1	2	(1)

Table 6.23: Joint Venture A1 performance data (Company A, 2011b)

Table 6.23 shows an increase in sales has been seen at Joint Venture A1. This is particularly positive as, generally, worldwide postal volumes are decreasing (Leonard, 2011) and the Post Office in Country A itself has been negatively impacted by this downturn in the market and shed over 1200 jobs in the 2009 alone (Besson and Dacey, 2010).

In an interview the head of the Post Office division for Post, Courier, Express, Parcel Global Operations and Network Management, (Dr A), suggested that business-to-business deliveries

were also falling due to the economic downturn but did suggest that business to end customer volumes were increasing (Dr A, 2011).

Figure 6.34 shows the number of items of mail Company A has handled each year due to this co-operation.

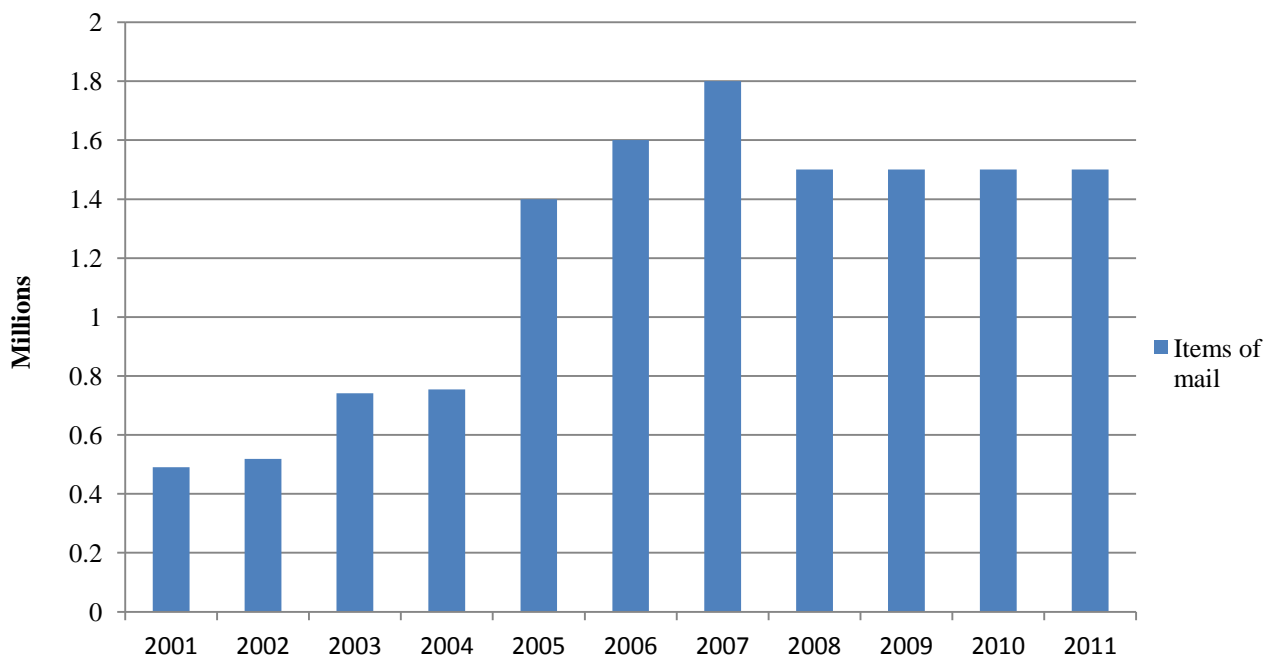


Figure 6.34: Items of mail sent through Joint Venture A1 (Joint Venture A1, 2010)

Figure 6.34 initially shows a positive trend, with the volume of mail, Company A was handling through the venture increasing. It should be noted when considering this increase, that if the year 2000, the year before the venture started, was included on the graph, it would read 0 as Company A handled no mail out of Switzerland until this joint venture started. This means that whilst the increase in mail between 2001 and 2011 is around 1 million items, the increase in the mail that Company A handled in 2011 due to this venture is 1.5 million items. To put this in context, Company A overall deals with an average of 725,000 consignments a day (Company A, 2011b), which is around 264 million a year which means the volumes generated through this joint venture relate to around 0.6% of Company A's overall total volume.

Figure 6.34 shows that peak volume was reached in 2007 and then fell in 2008 and that the volume has remained at a similar level in the following years. In the 2008 Company A annual report, Company A attributes this fall to the global economic crisis as illustrated by the graphs shown in Figure 6.35.

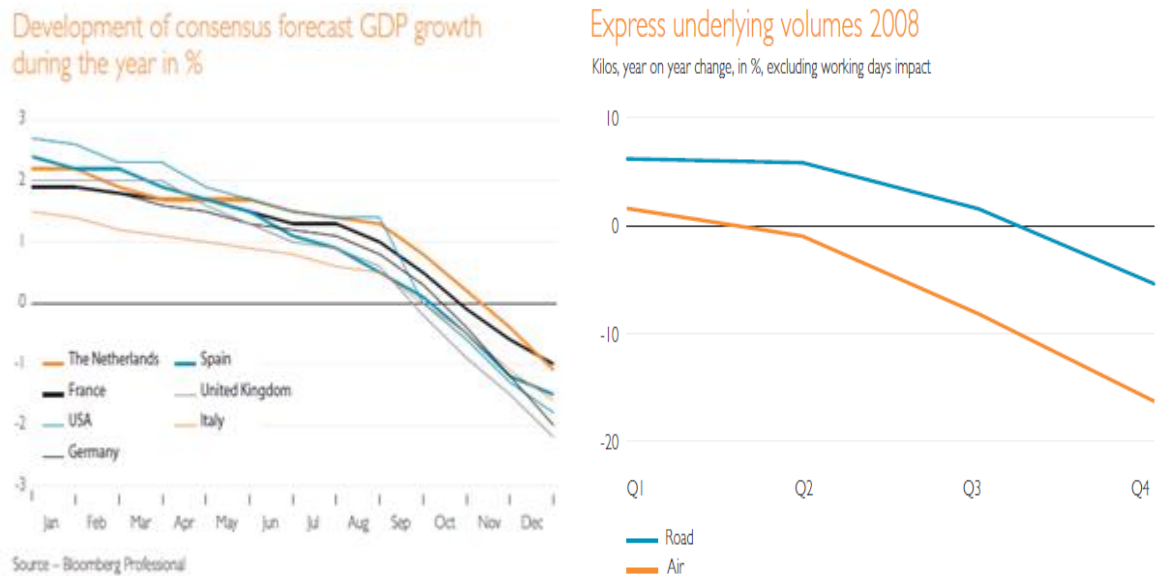


Figure 6.35: Volume decrease vs GDP growth (Company A’s previous Holding Company 2008)

It can be seen from the graphs in Figure 6.35 that the volume fall experienced by Company A in 2008 was in line with the GDP growth fall experienced in the global economic crisis and therefore can be discounted when considering how operating as a joint venture rather than a sole company has affected performance. However, it could be suggested that by operating as a joint venture Company A invested less in infrastructure to enter this market and therefore was less affected by the drop in volume due to the economic crisis than it otherwise would have been.

Despite the economic crisis the joint venture has been successful enough to require expansion of the original facilities. In July 2011, Company A moved one of its depots to a new location

which has double the storage space and 30% more office space (Company A's Holding Company, 2011b).

6.6.4.1 Cost-Related Performance Enhancements

This collaboration has allowed Company A to enter a new market at a lower cost than would usually apply to a similar expansion. If Company A had expanded into this market on its own, in terms of infrastructure costs it would have needed a network of places customers could purchase its services and drop-off letters and parcels. It would have not been possible to have branches to the extent that the national post office have branches without a high level of investment that is unlikely to be supported by the revenues generated. Post offices are able to support large numbers of branches due to the other services they offer as well as letter and parcel delivery. Company A would either have had to aim only for the business-to-business larger shipment orders or go into partnership with a retailer, for example in the UK, Partner A1's services can be purchased at Stationery Company A1s stores (Stationery Company A1, 2012).

In addition, Company A would need to expand its own network of subcontractors in Country A to allow it to handle outbound deliveries as well as the existing inbound deliveries. This would not only be costly in terms of buying the actual services but potentially in terms of time and money spent in negotiations with multiple hauliers, whereas by working with Country A's Post Office the extra capacity needed in the road network in Country A is absorbed by the Post Office, who already work with a number of subcontractors in Country A, so are likely to be able to negotiate extra capacity more easily and at a lower cost.

In addition, Company A had no market presence in Country A in terms of domestic sales and therefore would have had the added cost of building up its brand in Country A. By working

with the Post Office of Country A, a well established existing brand, Company A could access customers without major advertising and marketing expenditure.

6.6.4.2 Efficiency-Related Performance Enhancements

This initiative has enhanced the efficiency of both networks, by combining parts of the two networks, reducing the potential over capacity in both networks that would be present if they both operated full networks to service this demand. In terms of service, it has increased the perceived efficiency of the service being provided. This collaboration increases efficiency by allowing both companies to concentrate on their respective core competencies. In Company A's case this is the provision of a fast-paced network encompassing key business locations worldwide and in Country A's Post Office's case this is its closeness to its customers and its efficient local network across Country A.

6.6.4.3 Customer Service-Related Performance Enhancements

On celebrating the tenth anniversary of the joint venture, the former project manager of the joint venture and current Managing Director of Company A explained the benefits of the collaboration. "Thanks to this cooperation, Joint Venture A1 is able to offer a professional product from a single source. Company A through the Post Office reached a new group of customers and benefited from the dense post office network. Our customers now benefit from the outstanding quality and an even wider range of products. The secret of success lies in the fact that both companies fit into its core competence in the market. As Company A brings a broad and extensive international experience in the shipping business, The Post Office brings strong relationships with Country A's market" (Joint Venture A1, 2010b).

Addressing firstly the level of new customers the joint venture is able to satisfy, it can be seen from Figure 6.38 that Joint Venture A1 has captured a considerable percentage of market share. As mentioned previously, the Country A express market is expected to grow in value

by 3.8% annually over the next three years, therefore Company A has the potential to increase its revenue even if the market share does not continue to increase.

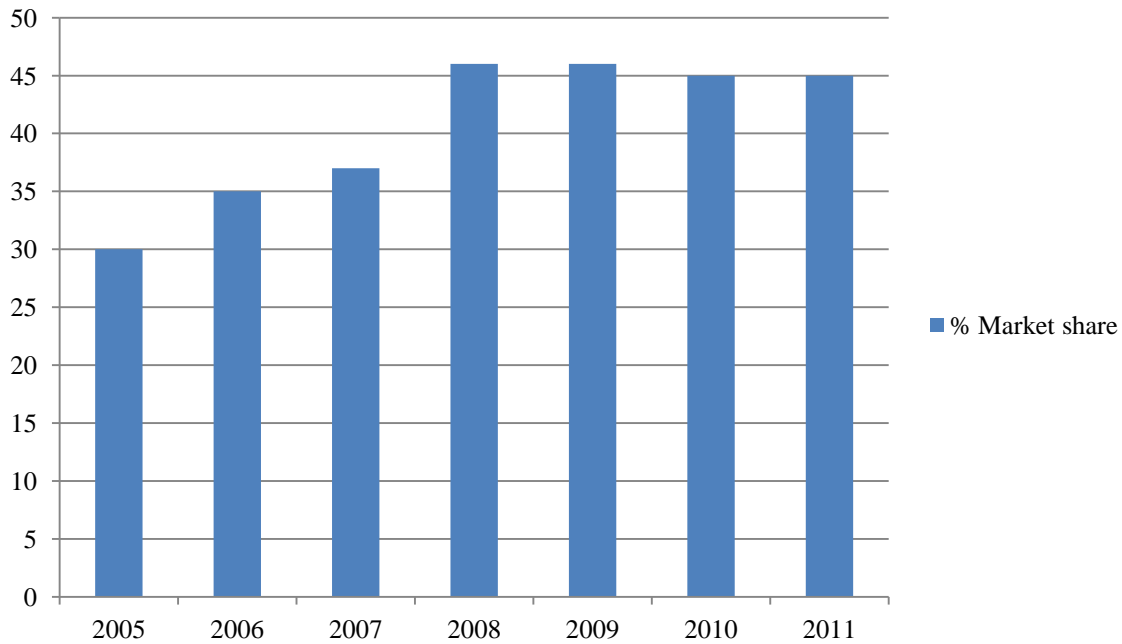


Figure 6.36: Percentage market share of Joint Venture A1 (Post Office in Country A1, 2011)

Figure 6.36 shows that the market share held by Joint Venture A1 has increased by around 15% in the last 6 years. Information on the market share in years preceding 2005 was not available. It should be noted that until this Joint Venture began, Company A had no presence in this market so now effectively has a 50% of a new 45% market share, which represents a large increase in customers.

From the overall increase in market share, it can be suggested that Joint Venture A1 is satisfying its customers more effectively than competitors and is therefore increasing its market share either by increased volumes from existing customers or from new customers who believe that Joint Venture A1 can offer them a superior service to the existing provider.

Considering actual customer satisfaction, Figure 6.37 shows the customer satisfaction ratings for the urgent deliveries that are handled by Joint Venture A1.

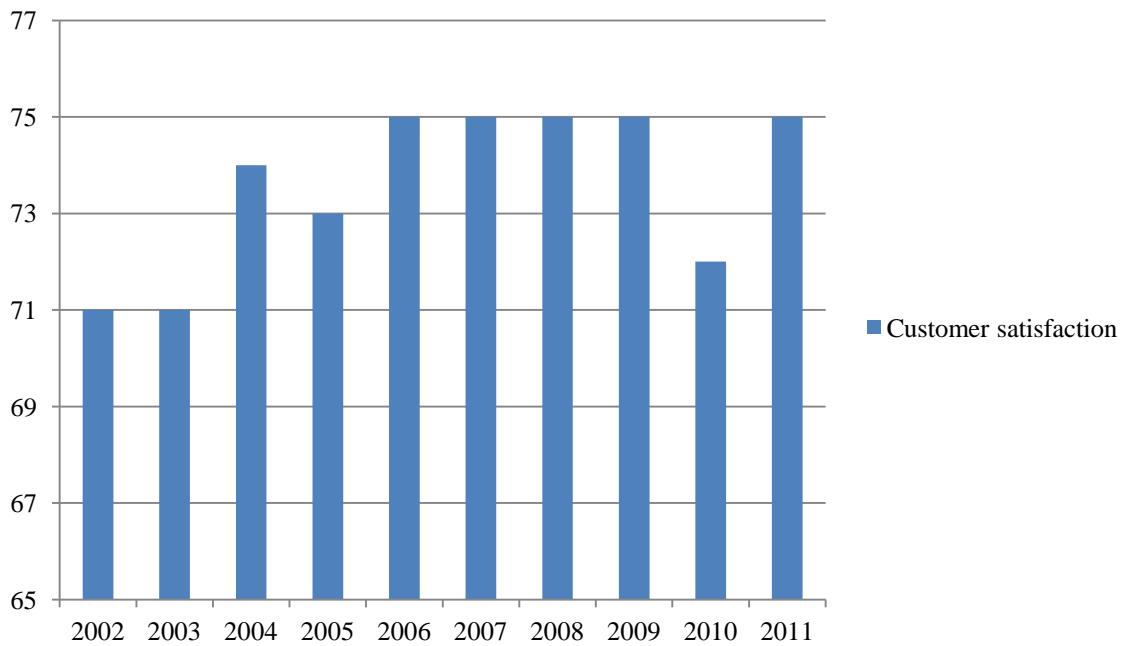


Figure 6.37: Customer satisfaction ratings for urgent deliveries (Post Office in Country A1, 2011)

Figure 6.37 shows that, generally, customer service levels increased and then levelled off to a fairly consistent 75. The 2010 report does highlight the fall in customer service but does not dwell on it as this was thought to be due to the economic downturn.

These figures do suggest a potential problem with this joint venture; Company A's overall global customer satisfaction percentage was 92 in 2010 and 2011 (Company A, 2011c), suggesting that this way of meeting customers' needs is not as effective as through its own individual operations.

Whilst customer service in this geographical area has been improved but is not equal to Company A's global customer satisfaction ratings, these were customers Company A previously did not have access to or the infrastructure to service. Equally, Country A's Post Office did not have the infrastructure to deliver urgent shipments outside the country. By working together the companies both access new customers and generally increase the provision of Express export services to the area. In 2009, these new services allowed

customers in Switzerland to send 1.5 million items (Joint Venture Company A1, 2010) at a quicker delivery rate than was available before the collaboration.

6.6.4.4 Flexibility-Related Performance Enhancements

Although flexibility was not a major concern in this collaboration, by utilising both companies' resources in the network, it allows both companies to use assets belonging to the other company freeing up capacity on some of its own assets, increasing the capacity and potential flexibility of its networks. By utilising Country A's Post Office operations, Company A gain access to a more flexible network, than is likely it would have been able to negotiate itself, due to the Post Office's higher capacity in the area and its existing relationships with sub-contractors.

6.6.5 Performance Enhancements in Relation to Indicated Key Drivers

The Company A questionnaire responses indicated that Company A is using horizontal collaboration to access new markets, reduce costs, reduce procurement costs, enhance customer service, to enable them to deal with demand fluctuations and reduce carbon emissions. This case has shown enhancements in the following areas.

- Access new markets; this has been shown to have been a key advantage to the collaboration with Country A's Post Office, gaining Company A a market share of around 45% of the Country A Express market, in which Company A had no significant presence until the start of this venture in 2000. This venture has allowed Company A to enter a new market in a strong position, in terms of being linked to an existing known brand and entering with a full range of services rather than a few trial services and/or services in limited geographical areas which is how it would have had to enter the Country A Express market if not for the collaboration. In terms of adding

to Company A's existing business, the volumes seen in Joint Venture A1 account for around 0.6% of Company A's overall business.

- Reduction of costs; horizontal collaboration has also allowed Company A to enter a new market without the significant infrastructure expenditure that would normally be associated with such a venture.
- Reduction of procurement costs; this has been of a less obvious advantage of the projects Company A has been involved in. This joint venture has given it lower procurement costs for services in terms of subcontracting transportation as the companies which they are subcontracting to already have a significant relationship with Country A's Post Office meaning the services they are providing to Joint Venture A1 are at a lower rate due to the existing business and relationships Country A's Post Offices already have with them. This is not a discount Company A would have achieved individually.
- Enhance customer service; this collaboration with Country A's Post Offices has allowed Company A to offer a complete range of services to a new market.

It can be concluded that it is not just Company A that has benefited from this collaboration as the company it has collaborated with is increasing the number of horizontal collaboration projects it is involved in. Country A's Post Office are continuing to grow there collaborations, with 2012 seeing the start of a new venture with Competitor A2 which will see the cross-border operations amalgamated in a new joint venture (Joint Venture A1, 2011).

6.7 Case Study 6

This case study is presented from a slightly different perspective from previous case studies, as the information that was obtained for this case study was from an individual who has only worked for the joint venture company, Joint Venture D1 rather than the founding companies.

For this reason, the case description focused on Joint Venture D1 and the general benefits it has brought to all partners rather than being presented from the perspective of one of the founding companies as in the Joint Venture A1 case.

This case was carried out using the case study protocol described previously; however, in this case the information was collected via e-mail rather than via face-to-face interviews due to the company being located in Spain. Information was collated from managers currently at the joint venture company and a manager who worked for one of the founding companies at the time the joint venture company was founded.

6.7.1 Introduction to Joint Venture D1

Joint Venture D1 is a warehouse and sequencing facility for automotive components. It also offers pre-assembly processes, and is linked by a conveyor connection to a major Automotive plant (plant D1) allowing it to provide sequential supply from a number of suppliers. It was founded in 1997 by four of the Automotive Plant D1's major transport suppliers, Logistics companies D1, D2, D3 and D4. The collaboration was initiated by the automotive company with a view to improving parts sequencing into Automotive Plant D1 which operates on JIT principles. The joint venture is evenly split between the four parties involved. The joint venture lasted eleven years and was sold in 2008 to a local supplier to Automotive Company D1.

The original idea for the creation of this joint venture came from the automotive company, which was a major customer of all four companies. Automotive Company D1 suggested the idea to its major transport suppliers to the plant due to a lack of space in its existing facilities to meet increased production requirements. A new manager at Automotive Plant D1 who was responsible for Transport and Customs was tasked with finding a solution to an issue it had

been having with sequencing due to parts arriving from other countries. The manager's solution was the development of a sequencing and sub-assembly facility on site.

Automotive Company D1 invited all of its major suppliers to join the programme; however, joining this programme was not a requirement of continuing to be an Automotive Company D1 transport supplier. Initially, none of the suppliers were interested and Automotive Company A1 had to pressurise its four major suppliers into forming the joint venture. The joint venture took around one year to develop.

Prior to the collaboration, the Joint Venture D1 facility was an existing warehouse, within a short distance of the D1 plant, which was being used as a customs warehouse for non-ECC goods. All of the companies involved already had warehousing facilities in the vicinity; however, none of these had a conveyor connection to the D1 plant. The facility that was taken over by Joint Venture D1 was close enough to Automotive Plant D1 for a conveyor between the joint venture's facilities and Automotive Plant D1 to be developed. This conveyor facility allows the companies involved to sequence all the parts they are responsible for delivering to Automotive D1 and send them when needed, meaning Automotive D1 does not need to keep inventory and allows it to operate JIT production.

Automotive D1 oversaw the setup of Joint Venture D1 and was involved in the negotiating and planning of the development at all stages due to it being located on land belonging to Automotive D1 and due to the importance of the project's success to Automotive D1's operations in the area.

The Joint Venture D1 facility has 35000m² of land and the original facility had 9100m² of indoor storage areas and an additional 1000m² of roofed storage space. In 2001, the Joint Venture D1 facility was extended to increase this to 19000m².

Joint Venture D1 has 21 multipurpose docks for receiving goods, on arrival the radio frequency (RF) tags are scanned and the stock levels are then updated automatically. These tags are also used in the warehouse for stock control and picking.

In 2006, before preparations began for the sale and transfer of Joint Venture D1 to a local supplier its annual revenue was 6.683 million Euros. This sale was not due to a lack of success of the project but due to conflict as three of the companies involved had been bought out by other logistics providers and the fourth partner had been rebranded and integrated with its parent company's other logistics service providers. With the management changes in the partner companies the focuses have changed and in 2005, Logistics Company D1 was the first to suggest that they wanted to pull out of the collaboration to concentrate on developing services at its own warehouses.

6.7.2 Joint Venture D1's Questionnaire Responses

Joint Venture Company D1's questionnaire responses indicated that Joint Venture Company D1's main activities fell into the categories of 3rd party logistics and warehouse and distribution activities. In terms of annual revenue Joint Venture Company D1 fell into the third category which represents 22% of the respondents.

In terms of drivers to collaboration, the reduction of transport costs, the reduction of procurement costs, the enhancement of customer service, improved vehicle utilisation and allowing for easier response to demand fluctuation were all selected by the respondent. Comparing this to the top five drivers indicated by the overall results, the only one not indicated by the Company D1's responses was the accessing of new markets; this would be explained by the fact that this joint venture was developed to improve service to one particular customer and was never expected to involve nor ever actually involved other

customers. The respondent also indicated that customers requesting that companies work with its partners can also be an important driver encouraging companies to collaborate.

In terms of barriers to collaboration, lack of trust, difficulty agreeing terms and conditions of the project and management unsupportive of such projects were all highlighted. In this case, the most popular response found in the questionnaire, competitors gaining access to sensitive information, was not highlighted whilst management unsupportive of such projects, the second least common barrier, was indicated. The lack of management support causing problems could have been more prominent in this case than in others, due to takeovers of the companies involved during the timescale of the collaboration. The respondent also suggested that there are difficulties agreeing common actions as well as difficulties agreeing terms and conditions.

Unlike the majority of companies which responded to the survey, Joint Venture Company D1 is only involved in one type of collaboration, joint ventures, which was the second least commonly undertaken form of collaboration, and of those, under 20% were not involved in another form of collaboration. These differences are thought to have been influenced by the individual completing the questionnaire, as stated above, this was an unusual situation, where the respondent worked directly for the joint venture but not for any of the parent companies.

In terms of actual resources shared, Joint Venture Company D1's responses were typical of the dataset gained from the questionnaire, with Joint Venture Company D1 indicating it was sharing truckloads and warehouses, which were the two most common responses. Joint Venture Company D's responses did also indicate some sharing of suppliers and back office resources, which were more unusual forms of collaboration.

Similar to the majority of respondents, Joint Venture Company D's collaboration has lasted for over 5 years. Joint Venture Company D's responses to the number of partners question,

did not fit the majority of respondents, with the largest proportion indicating that they were collaborating with 6 or more companies whereas Joint Venture Company D is a collaboration of just 4 companies. This is especially unusual for companies which have been collaborating for so long, but as suggested previously this is explained by the view of the respondent. It is probable that all the four partners involved in Joint Venture Company D collaborate with other companies in the logistics industry and some of these collaborations are discussed in further sections.

Another difference between Joint Venture Company D's responses and the most common responses was the location of the partners, only 27% of respondents indicated that its partners had offices that were located locally to its own. Compared to 47% whose partners were located elsewhere in the same country.

6.7.3 Joint Venture D1's Network Structure

This section briefly introduces the companies involved in the joint venture and then describes Joint Venture D1's supply chain. All four of the companies involved were already undertaking logistics services involving the transportation and storage of parts to Automotive Plant D1 and had a significant presence in the area.

Logistics Company D1 was a Spanish transport group which was founded in 1943 and focused on European road and rail transport and by the 1990's was being advertised as an Integrated Logistics Operator. Logistics Company D1 aimed to provide full logistics services, as well as road and rail transportation. It offered a whole range of logistics services including storage, consolidation, management of vehicle logistics centres and assembly of modules (Logistics Company D1, 2007a). Logistics Company D1's business was centred on three main markets, firstly, providing transportation for parts and components, primarily to the automotive industry, secondly, transportation of cars, and thirdly, the transportation of

chemicals and bulk liquids, with general cargo only accounting for around 8% of its total movements (Logistics Company D1, 2007b).

Logistics Company D1 had grown from a company that specialised in transporting cattle around Spain in the 1940's to being an integrated logistics operator through diversification; focus on technology development and through acquisitions, strategic alliances and joint ventures. It was in the 1960's that Logistics Company D1 started to create subsidiaries in other European countries including France, Germany, Portugal, Switzerland and the UK. Further subsidiaries were developed in the 1980's and 1990's to expand the geographical markets and to enable it to specialise in providing value-added services to certain industries for example the automotive industry.

The 1990's and 2000's saw Logistics Company D1 participate in a number of horizontal collaboration projects including,

- A partnership with a German transport firm, to strengthen the positioning of automobile components transport in Europe.
- A joint venture with three large logistics companies which focused on international cereal transportation.
- A further joint venture which was created to develop transportation, storage and distribution of automobiles in the Iberian Peninsula (Logistics Company D1, 2003).

Logistics Company D1's services to the automotive industry began to develop in the 1970's when it began to win contracts with major automotive companies such as Seat, Renault and Citroen. One of Logistics Company D1's subsidiaries focused on developing this market throughout the 1980's particularly in terms of establishing vehicle reception and storage centres. Transportation of finished automobiles accounted for around 20% of Logistics Company D1's business at the end of its involvement in Joint Venture D1. Components and

parts such as those handled through Joint Venture D1 accounted for around 65% of Logistics Company D1's business by the end of Joint Venture D1. The Joint Venture contributed 5% of Logistics Company D1's annual revenue in 2006.

In 2008, the majority share in Logistics Company D1 was bought out by Company D6 and Logistics Company D1 was incorporated into the rail business unit, although to some extent it is still operated separately to retain the brand it had built up particularly in Spain and Portugal (Transport Intelligence, 2012).

Logistics Company D2 was founded in 1943 in Santander and was a leading specialist in industrial palletising services and a leader in the Spanish road haulage market. Logistics Company D2 had a large network of facilities across Europe to allow it to offer a large scope of logistics services including consolidation and assembly of modules. It served various market sectors, such as automotive, chemical, paper and printed media, consumer goods, industrial, DIY and building products, and foods and beverages (Bloomberg Business Week, 2012).

Similar to Logistics Company D1, a large proportion of Logistics Company D2's business came from automotive companies such as Opel, Renault, Ford, Nissan and Rover (Logistics Company D7, 2007).

In 1999, Logistics Company D2 was bought out by Logistics Company D7, allowing Logistics Company D7 to develop a presence in Spain and Portugal. 2008 saw a further takeover with D7 being integrated into Logistics Company D8 as part of Logistics Company D8's bid to expand its operations in central and southern Europe (Logistics Company D8, 2011).

Logistics Company D3 was a logistics provider founded close to Automotive Plant D1. Like the previous two companies it provided a full range of services and the majority of its

business came from automotive companies such as Automotive Company D1. Information on Logistics Company D3 was particularly difficult to find as in 2009 Logistics Company D3's holding company amalgamated all of its logistics interests into one company, Logistics Company D9 (Logistics Company D9, 2009) and in contrast to Logistics Company D1's takeover by Logistics Company D6 all the existing services were rebranded under the new name.

Logistics Company D9 provides integrated logistics services through its network of 14 hubs across 8 European countries including its hub near to Automotive Plant D1 which was originally the headquarters of Logistics Company D3. Logistics Company D9 divides its services into three main categories, transport services, storage services and production logistics. In terms of production logistics, Logistics Company D9 offers services including the undertaking of assembly tasks and supply sequencing to enable JIT production.

Logistics Company D4 was, at the beginning of the joint venture, a German Logistics provider which first started operating in Spain in 1991 when it bought out a Spanish logistics company based in Barcelona, Logistics Company D10, and therefore as with the other companies had a well established presence in Spain (Logistics Company D10, 2006). Like the other companies in the collaboration it already had a hub near to Automotive Plant D1. Logistics Company D4 also had branches in Austria, Benelux, Bulgaria, Commonwealth of Independent States (CIS), the Czech Republic, England, France, Greece, Hungary, Ireland, Italy, Poland, Portugal, Romania, Scandinavia, Slovakia, Switzerland, The Baltic, Turkey, Argentina, Taiwan, and Houston.

Logistics Company D4 was split into 3 divisions, Transportation, Logistics Services and Automotive Services. In terms of transportation it offered national and international delivery with road, sea and airfreight options. Its logistics services included warehousing; value added services and e-logistics services. In terms of automotive services it offered supply chain

management services, inbound and outbound logistics, warehousing and value-added services such as assembly (Kargomarket, unknown).

As with the other companies involved in the joint venture, Logistics Company D4 was bought out by a larger logistics provider, Logistics Company D10 in 1999, to give Logistics Company D10 a European land network allowing it to become a provider of integrated logistics services throughout Europe (Admin, 1999). When this was announced, the plan was for Logistics Company D4 to form a separate division and retain its name, however, an internet search for Logistics Company D4 in 2012 gives very little up to date information and the Logistics Company D4 website has been shut down.

Joint Venture D1's customers, a number of Automotive Company D1's suppliers, provide the components needed by Automotive Company D1 from production facilities in a number of countries throughout the world as illustrated in Figure 6.38.

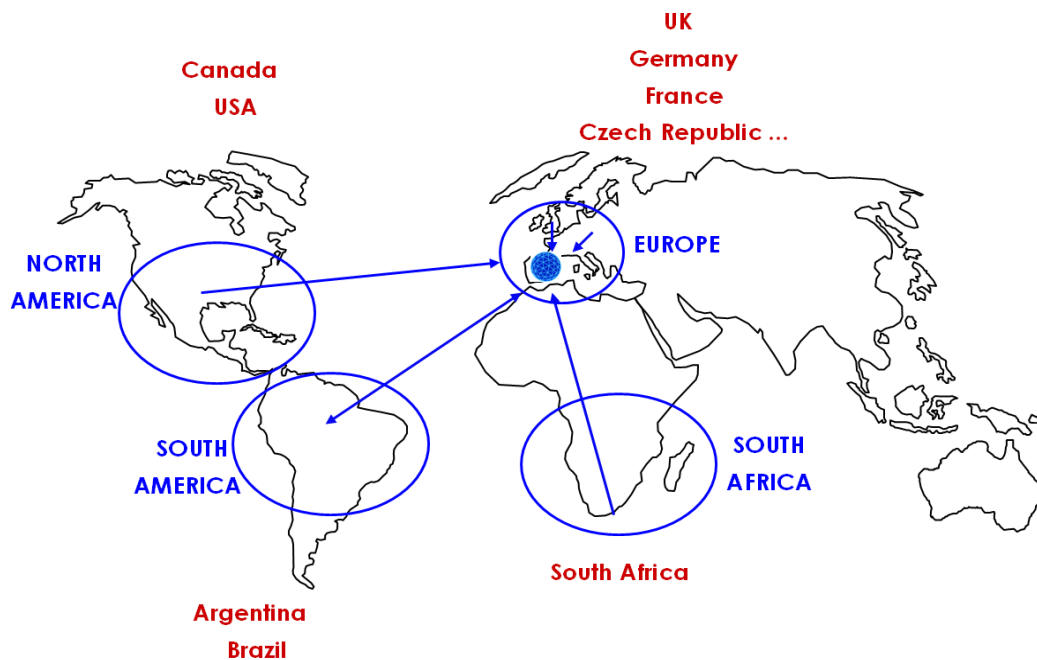


Figure 6.38: Joint Venture D1's customers/Automotive Company D1's suppliers (Joint Venture Company D1, 2000)

It can be seen from Figure 6.40 that due to the geographical spread of the suppliers, it would be difficult for many of them to provide a JIT materials service to Automotive Plant D1 due to the long distances and unpredictability of transport in terms of journey times. Also due to the wide range of suppliers sequencing would be difficult to achieve without the use of a warehousing and sequencing facility such as Joint Venture Company D1.

Joint Venture Company D1's role in the supply chain is to operate as a logistics centre offering services such as storage, stock control, assembling sub-assemblies, quality inspections and re-work, sequencing and JIT delivery for material entering Automotive Plant D1 from suppliers located at any geographical location and for parts and assemblies from other Automotive Company D1 plants as shown in Figure 6.39.

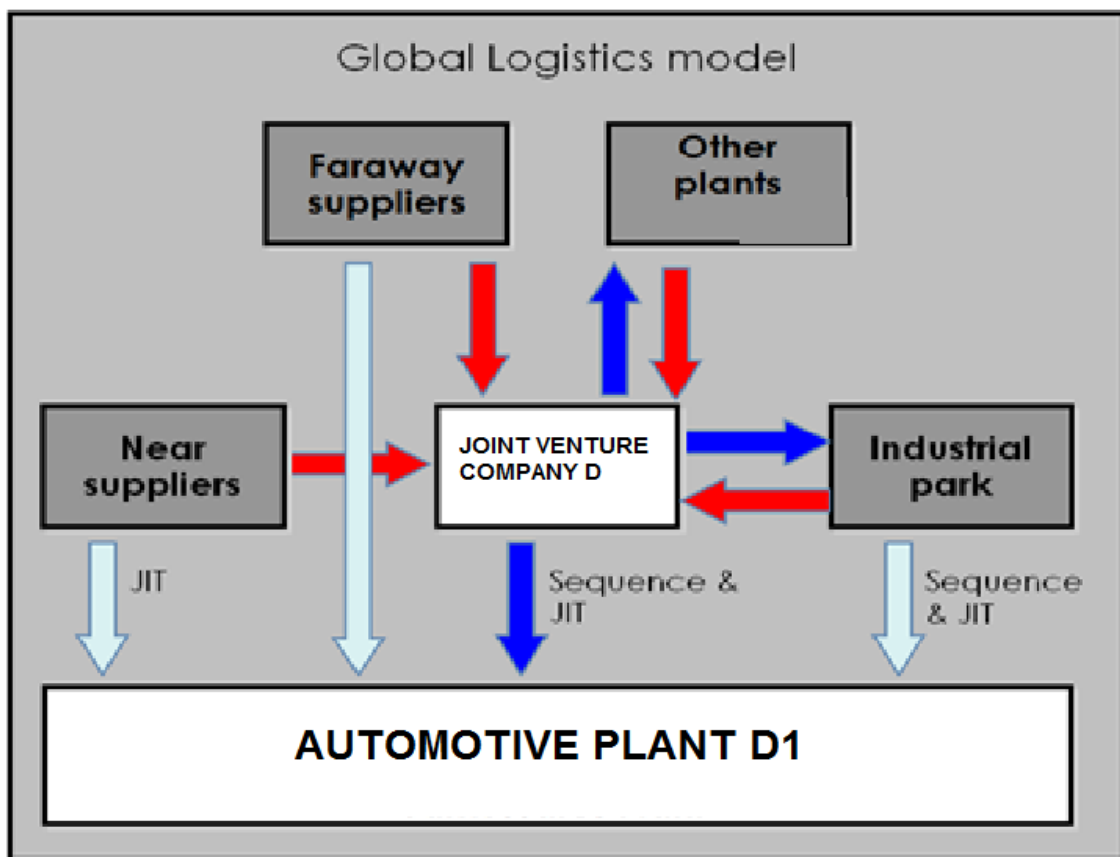


Figure 6.39: Joint Venture Company D1's logistics model (Joint Venture Company D1, 2000)

It can be seen from Figure 6.39 that Joint Venture Company D1 is not only storing and sequencing parts from suppliers located faraway but is also providing parts from component suppliers to assembly suppliers and sequencing parts from local suppliers.

Joint Venture Company D1 supplies parts to Automotive Plant D1 on a JIT basis, through the use of both the conveyor and through truck deliveries. Sequenced parts delivered by the conveyor include

- ABS module (Model D1)
- Battery junction and door lock feed/ engine control (Model D1)
- Break Booster (Model D1)
- Exhaust pipe (Models D1 and D2)
- Fuel Tank (Models D1 and Models D2)
- Gear Shift (Model D1)
- Heater Blower (Model D2)
- Partition wall (Model D2)
- Shock absorbers (Model D2)

In terms of sequenced parts delivered on the conveyor, the average transit time is 17-25 minutes and more than 10000 components and sub assemblies were being delivered per day to Automotive Plant D1 in 2000. This includes 12 families of parts which are handled through six different sequencing cells at Joint Venture Company D1. These parts are each labelled with a sequence number, part number and time of loading. Around 0.5-1 days' worth of sequenced stock is kept for each part and inventory levels are updated through the RF system each time an inbound or outbound movement occurs. Parts are picked on a first in first out (FIFO) basis.

Parts delivered through Kan ban and sequenced replenishment in trucks, for the Model D1 assembly line, include

- Air conditioner elements
- Catalytic convertors
- Fog lamps
- Head lamps
- Oil pan
- Pistons
- Rear lights
- Throttle body

It should be noted that a considerable percentage of the parts on the two lists have multiple variants, as mentioned previously parts such as the exhaust pipe assembly differ depending on whether the car is right hand or left hand drive. Parts such as the fuel tank depend on the exact model with Model D2 being available with a 1.2l petrol engine or a 1.3l diesel engine and the Focus being available with a 1.6l or 2.0l engine.

Actual material and information flows between Joint Venture Company D1, Automotive Plant D1 and its suppliers are shown in Figure 6.40.

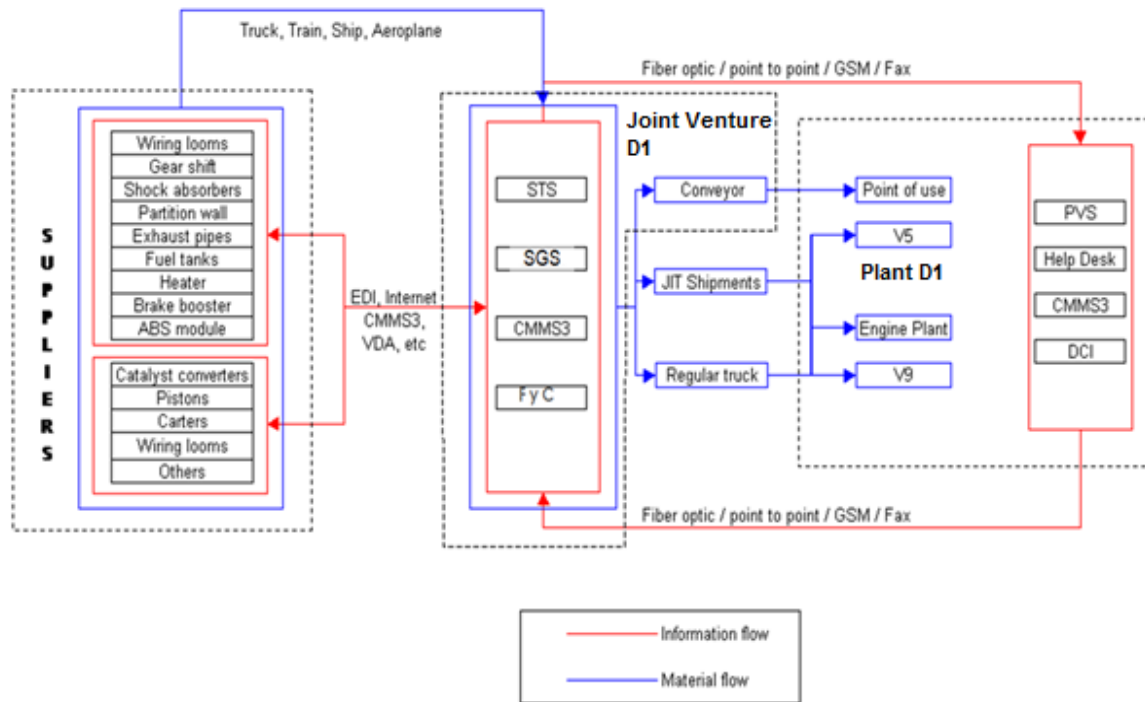


Figure 6.40: Information and material flows (Joint Venture Company D1 2000)

It can be seen from Figure 6.42 that a wide variety of parts come into Joint Venture Company D1 and are stored and assembled in a number of areas before they are delivered to Automotive Plant D1. Figure 6.40 also shows tight information based links between the companies with information on delivery times, production schedules and inventory levels being shared between the companies via electronic data interfaces. The information systems used are explained in Table 6.24.

System Name	Description
CMMS3 (Common Materials Management System)	An Automotive Company D1 global system linked to a single shared database that manages material scheduling, inventory management and cost accounting. Customer orders are loaded via PVS and materials called-in via the DCI system.
DCI (Daily Call In)	System to output supplier schedules with 10 day visibility in daily quantities, and 6 month visibility in more tentative weekly and monthly forecast quantities.
PVS (Plant Vehicle Scheduling)	Automotive Company D1 system, holding vehicle orders and scheduling in-plant build information. The systems receives customer orders on a daily basis from a central order bank and provides the manufacturing plant with the capability to control and track the build of each vehicle. The total process from body construction through to final assembly is monitored by the PVS system.
ILVS (In Line Vehicle Sequencing)	Automotive Company D1's system for plant vehicle sequencing that operates to restore sequencing disruptions. Reads body type and substitutes oldest suitable to restore sequence.

Table 6.24: Description of Automotive Company D1's proprietary systems (Coronado Mondragon year unknown)

6.7.4 Performance Enhancements of Collaboration

The overall objective of this collaboration was to reduce the overall logistics costs across Automotive Plant D1's supply chain.

The main advantages to this collaboration did not benefit the companies involved in the joint venture, but benefitted its main customer. The main benefit of the collaboration was the simplification of goods inbound flow to Automotive Plant D1. The four companies did gain some benefits from the collaboration, as its willingness to participate will have increased the companies' positions among Automotive Company D1's transport suppliers.

6.7.4.1 Cost-Related Performance Enhancements

The main cost savings achieved by this collaboration were gained by Automotive Company D1 and were due to the simplification of processes and reduced assembly costs due to the outsourcing of some assembly activities to the logistics companies involved in the collaboration. The four logistics companies also benefitted from an increase in the services they could offer Automotive Plant D1 without having to invest substantially in infrastructure as the building of the conveyor was paid for by a local government grant and the cost of maintaining the conveyor is paid for by Automotive Company D1. Whilst the extra services are only applicable to Automotive Plant D1, the logistics companies gained competencies in these services that they could not have afforded otherwise. These extra competencies could have potentially aided them in bidding for work with other companies.

Comparing the proportion of the revenue attributed to Joint Venture D1 that was received by Logistics Company D1 and Logistics Company D1's portion of a similar joint venture that they are involved in, Joint Venture D2, it can be seen that Joint Venture D1 has generated a similar level of revenue for Logistics Company D1 as the similar joint venture. Logistics Company D1's Joint Venture D1 revenue was 1.67 million Euros in 2006 compared to 1.42 million Euros from Joint Venture D2 (Logistics Company D1, 2007c). Joint Venture D2 was set up in 2005 and is jointly and equally owned by Logistics Company D1 and its partner to handle deliveries from Turkey to Spain.

6.7.4.2 Efficiency-Related Performance Enhancements

In terms of efficiency, whilst Automotive Company D1 has benefitted from the majority of the performance enhancements, the efficiency improvements have aided the logistics companies in addition to aiding Automotive Company D1. Whilst the major efficiency enhancement has been in terms of material arriving pre-sequenced on a conveyor at

Automotive Company D1, reducing issues with trying to sequence material coming off different trucks.

The sequencing of material entering the Automotive Plant D1 has allowed Automotive Company D1 to improve the efficiency of its space utilisation. Previously stock of all the possible variations for a particular part had to be kept at Automotive Plant D1, close to the production lines to allow Automotive Company D1 to fulfil all its orders. Now the parts arrive in sequence, at Joint Venture D1 they can send parts according to the production schedule they receive from Automotive Company D1. An example of this is the exhaust pipe. This differs depending on whether the car being produced is right or left-handed drive, instead of Automotive Company D1 having to keep stocks of both variants at the assembly line, the correct exhaust pipe arrives at the time required in the production schedule from the Joint Venture D1 facility.

The production volumes have increased at Automotive Plant D1 since the implementation of the joint venture, with peak production of 450 thousand cars occurring in 2004 (Automotive Company D1, 2010). It is now thought that Automotive Plant D1 would have extreme difficulty in operating without the Joint Venture D1 facility due to the amount of added space that would be needed at Automotive Plant D1, itself, to bring the tasks currently being undertaken by Joint Venture D1 back in house.

Parts and sub-assemblies delivered to Automotive Plant D1 via the conveyor take 17-25 minutes to arrive, all four of the logistics companies had warehouses within 10 minutes drive of Automotive Plant D1, suggesting in time terms this is not as efficient a delivery method. However, prior to the creation of Joint Venture D1, one of Automotive Company D1's big problems was that they did not have enough truck docks feeding into its production facilities to cope with the volume of traffic which was at that point around 2000 trucks per day, each bringing a different set of parts. This meant there were high wait times for trucks waiting to

unload and it was difficult for Automotive Plant D1 to sequence the deliveries, meaning important parts could get delayed in the queues.

Whilst Joint Venture D1 is only thought to have decreased the number of trucks arriving at Automotive Plant D1 by around 40 per day, it has taken many of the parts that had the longest unloading times away from the vehicle unloading bays, taking out the bottleneck at this process. With some of the components taking around 40 minutes to unload from the trucks plus the transit time, it can be seen that it is a much quicker delivery process to Automotive Plant D1 if the components are stored and delivered by the conveyor belt.

Whilst this mainly affected Automotive Company D1, the logistics companies were losing productivity as it was the logistics companies' vehicles and drivers which were sat idle, increasing the average cost and time it took to deliver to Automotive Plant D1 and therefore reducing the logistics companies' profit and available resources. The conveyor allows parts and sub-assemblies to be delivered efficiently in sequence. Since the 4 companies involved in Joint Venture D1 were the main transport providers for Automotive Plant D1, the reduction in trucks needed released around 2% of each company's trucks going to Automotive Plant D1. These trucks will instead be going to the Joint Venture D1 facilities where they do not need to wait as long before they can be unloaded, freeing up vehicles.

6.7.4.3 Customer Service-Related Performance Enhancements

The companies involved in Joint Venture D1 saw improvement in its customer service to Automotive Company D1, as Joint Venture D1 allowed them to offer new value-added services to Automotive Company D1. Before Joint Venture D1 was founded, the four companies were only delivering components and sub-assemblies from Automotive Company D1's suppliers. Joint Venture D1 gave them the opportunity to expand the work done with Automotive Company D1 to include assembly and sequencing work in addition to

transportation. This has given the companies each around 1.3 million Euros a year in extra business.

No promises were made to the companies which entered the collaboration that the company's positions in Automotive Company D1's supplier group would be increased, by the willingness to participate in this collaboration but its involvement did increase the amount of work subcontracted to them by Automotive Company D1 and allowed them to carry on working with Automotive Company D1. Failure to become involved with this collaboration may have negatively impacted on the relationships with Automotive Company D1. No logistics companies other than the four that were involved in Joint Venture D1 (and its parent companies) have been awarded a major logistics contract to serve Automotive Plant D1, since the start of Joint Venture D1.

Logistics Company D1, after the set up of Joint Venture D1, did continue to win new contracts from Automotive Company D1 including new delivery contracts to deliver from Turkish suppliers in 2006 and the contract Logistics Company D1 had with Automotive Plant D1, separate to the collaboration was renewed in 2008.

Automotive Company D1 received sufficient benefits from this collaboration to lead it to facilitate the creation of further joint ventures, to provide sequencing and sub-assembly, to three of its other plants.

6.7.4.4 Flexibility-Related Performance Enhancements

This venture has allowed the companies involved to branch out in terms of the logistics services they provide. Whilst all of them offered integrated logistics services and were existing transport suppliers to Automotive Company D1, they each had key areas that they particularly specialised in. Logistics Company D1 had always been particularly focused on rail, Logistics Company D2 on national transport in Spain and Logistics Company D4 on

European transportation. This venture allowed each company to expand on its individual competencies and to learn from the different company's expertise.

The venture also allowed each company to extend its existing service provision in terms of pre-assembly and sequencing services. Whilst the use of these in Joint Venture D1 can only be used to provide enhanced services to Automotive Company D1, the companies' ability to provide these services may make them a more attractive choice for other customers and increase the chances of winning contracts for similar ventures.

Automotive Company D1 saw significant flexibility improvements due to the outsourcing of processes to Joint Venture D1. This has led to the increase in the number of models produced at Plant D1 from one, prior to the joint venture, to five. Automotive Company D1 does not believe that this would have been possible prior to the joint venture due to the volume of deliveries that are needed.

6.7.5 Performance Enhancements in Relation to Key Drivers

In terms of the key drivers for horizontal collaboration that were selected in the Joint Venture D1 responses, it can be seen that an improvement in customer service is the main one that has been achieved in this case. The efficiency of the delivery to parts and sub-assemblies to Automotive Company D1 has been enhanced significantly and a number of tasks such as sequencing and some pre-assembly have been shifted so that it is no longer done by Automotive Company D1 directly but is instead taken care of by Joint Venture D1. This allows Automotive Company D1 to focus on its core competencies and improves customer service.

In terms of reduction of transport costs, this venture has shown reduction of transport costs across the supply chain rather than simply a reduction for the logistics company. The conveyor systems reduces transport costs and allows Joint Venture D1 to act as a buffer

between Automotive Company D1 and its suppliers allowing for easier response to demand fluctuations at Automotive Plant D1 to be achieved.

6.8 Case Study 7

This case study relates to the joint procurement activities undertaken by Company E on the behalf of its customers. This case was carried out using the case study protocol described previously; in this case two interviews were carried out with the Managing Director and a number of secondary sources including company documents and procedures that were provided by the respondent were analysed.

6.8.1 Introduction to Company E

Company E was founded in 2008 and is described on its website as being a ‘complete logistics supermarket’ (Company E, 2012). As a 4th Party Logistics Provider, it aims to be a one-stop shop for logistics solutions. Company E does not carry out any of the operations itself and collaborates with a large range of logistics providers to allow it to meet all of a particular customer’s requirements, however diverse these maybe. Its introduction goes on to suggest that its aim is to be a bit like a personal shopper, ‘we take away the hassle, work within your budget and find the solution that suits you best’ (Company E 2012).

Company E’s services fall into a number of categories these are

- Mail – these services are aimed at customers sending more than 500 items at a time in the UK or more than 25 items internationally and include sorting services and direct mail services such as manage mailings using client-owned or outsourced databases, laser copying and mail merging cover letters as well as handling and fulfilling orders generated from the campaign.
- Parcels – these services allow customers to utilise a number of parcel services depending on the size and weight of the parcel, the urgency of the delivery and the

amount the customer is willing to pay. These services include UK and worldwide delivery.

- Pallets – for larger shipments, Company E utilise the road pallet network to deliver pallets throughout the UK and Europe.
- Freight Forwarding- Company E has a network of global suppliers allowing it to arrange for freight forwarding by air or sea worldwide. This includes special services such as the handling of dangerous or temperature-controlled goods and the arranging of customs clearance where necessary.
- Haulage – Company E has access to thousands of vehicles in the UK and Europe to allow customers shipments to be delivered door-to-door in the most suitable vehicle possible including box vans, flat bed vehicles, low loaders, double deckers etc.
- Warehousing – Company E work with numerous European warehousing companies to provide storage facilities at strategic locations all over Europe. Company E can offer additional services at the warehousing facilities including stock management, replenishment, pick and pack, specialist loading and handling, bonded warehousing and secure storage of personal effects.

Company E is a very customer-focused company aiming to provide win-win solutions for the customer and to maintain its existing customers and increase the business it does with the customer before trying to win new customers. Its Managing Director does not believe this is true of many companies in the logistics industry, particularly those in the parcel industry, where they have seen many instances where sales teams are judged solely on its new customer business and not on customer retention or increase in an existing customers business. Company E monitors its delivery performance for all customers on a monthly basis and then shares this data with the customer to ensure that it is providing a reliable service.

In terms of attracting new customers Company E has a ‘10 minute test’ on its website for each of its service categories. This allows Company E to assess exactly what services a customer requires and to design a potential solution package specifically for that company. Some of these questions are obviously tailored to allow Company E to show it provides a better service, for example, does your current supplier provide you with a dedicated customer service contact? Do you receive monthly performance delivery reports from your provider? Are you automatically notified of problems? Some of these are services that a small 4th Party Logistics Provider such as Company E is able to provide, such as a dedicated customer service contact, that the large parcel companies are unlikely to be able to provide, or be interested in providing for smaller customers. The other points are linked to information provision that Company E can provide due to a dedicated customer portal known as Automated Customer Executive (ACE).

The majority of the questions on the test relate to the customers exact requirements such as average monthly spend, average volume per week, percentage of shipments that only contain a single item, current collection times, average, minimum and maximum weights and sizes and a brief description of the goods that the company ships.

Company E’s strategy has allowed it to significantly increase its turnover over the past 2 years, as illustrated by Figure 6.41.

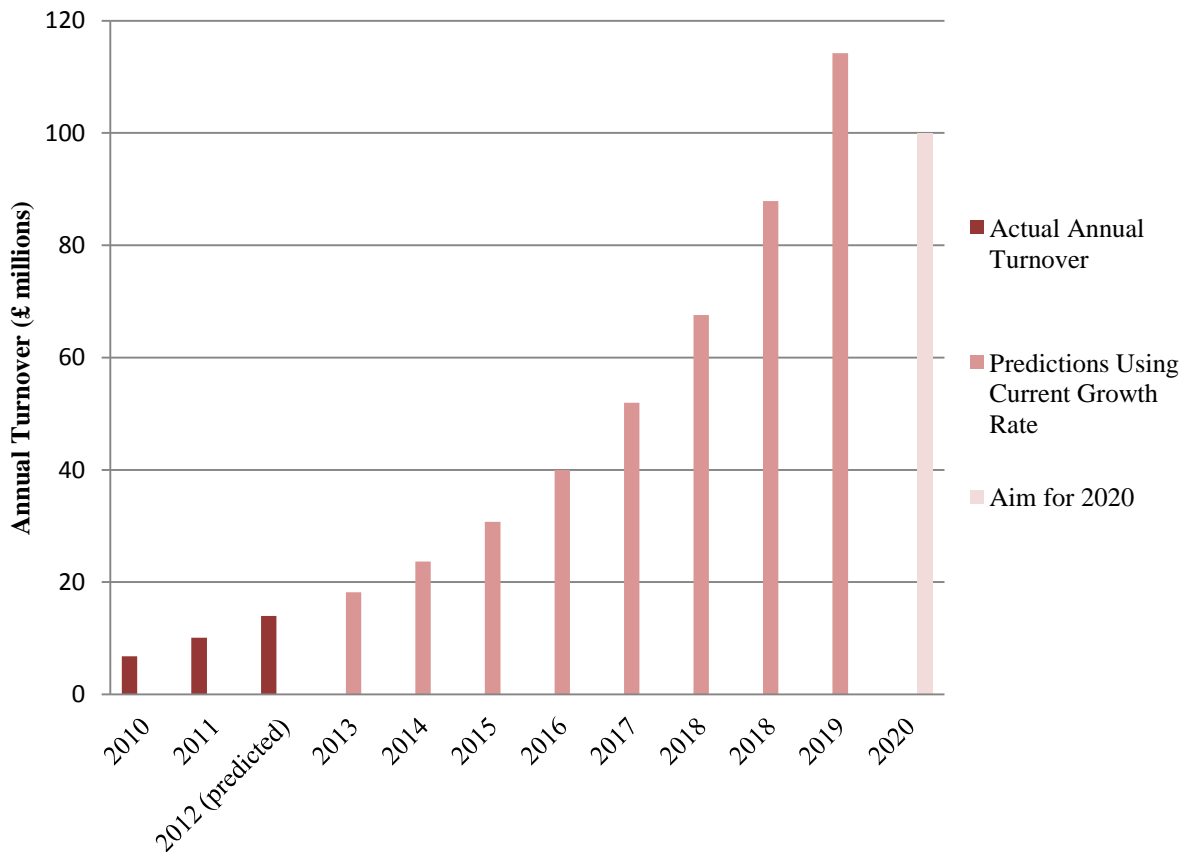


Figure 6.41: Actual and predicted turnover for Company E

Company E is currently aiming for a 30% increase in annual turnover each year, with the long term goal of reaching a turnover of £100 million by 2020. Figure 6.43 shows that in 2011 Company E exceeded the 30% target by around £1.15 million, giving an annual turnover growth of 47%. Company E's current prediction for the end of 2012 suggests another year of higher growth at around 40%.

6.8.2 Company E's Questionnaire Responses

Company E, like the majority of companies that responded to the questionnaire, is currently collaborating with both direct competitors and potential competitors. In addition to this, Company E is also looking for potential collaborators. Under one third of the total respondents indicated that they were looking for partners. This suggested that Company E is

still growing its involvement in horizontal collaboration to a greater extent than other logistics companies.

In terms of drivers for horizontal collaboration, Company E indicated that it believed accessing new markets, reducing transport costs and enhancing customer service were all drivers for horizontal collaboration and these were the top 3 drivers highlighted by the questionnaire. The fourth most popular response was improvement of vehicle fill utilisation, with 52% of respondents indicating that it was a driver to horizontal collaboration. This was not selected by Company E, this could be because it does not actually own or operate any vehicles itself. Company E did indicate that it believed the reduction of administration costs was a major driver for horizontal collaboration which was a less popular response with only a quarter of respondents selecting this as a driver.

Similarly, Company E's responses to the question concerning barriers to horizontal collaboration were generally in agreement with the majority of respondents. Company E's responses indicated three barriers to horizontal collaboration. These were lack of trust, fear of competitors accessing sensitive information on business operations and difficulty in finding partners, which were the 3 most popular responses, with over 70% of respondents agreeing with the first two barriers.

Company E's responses showed that they are already involved in shared services, the form of horizontal collaboration that the questionnaire showed to be the most popular, in the logistics industry and also in joint procurement, which in contrast was the least undertaken type of horizontal collaboration. This was not found to be an unusual combination with 80% of companies undertaking joint procurement also being involved in shared services.

Company E's involvement in horizontal collaboration in terms of the resources that it is sharing with its partners was shown to be more unusual. Company E indicated that it is

sharing suppliers and back office resources which were both being undertaken by less than one quarter of the respondents. These were the only types of resources the respondent indicated that Company E was sharing.

It was indicated that Company E's involvement in horizontal collaboration was more recent than the majority of the respondents, at only 1-2 years; this could be due to the relatively young age of the company, as it was only founded in 2008.

As with the majority of respondents, Company E is working with a number of different partners, although 38% of respondents indicated a higher number of partners. Similarly, Company E's response that it was involved in more than 4 separate horizontal collaboration projects agreed with the majority of respondents.

As would perhaps be expected from a company undertaking joint procurement, Company E's partners are all within the UK. 57% of the total respondents also indicated that all its partners were located in the same country as they were located in.

Company E has found joint procurement and shared service to be very effective, with the sharing of back office resources being slightly less effective than the sharing of suppliers. Moreover, Company E rated both to be more effective than the average responses of 1.08 and 1.78 respectively.

6.8.3 Rationale for the Case Study

Company E was approached as a case study for a number of reasons. The primary reason was its involvement in joint procurement. Joint procurement was shown in the questionnaire to be the least commonly used type of horizontal collaboration in the logistics industry. Whilst all the companies which had indicated they were involved in joint procurement were contacted as potential case studies, Company E was the only company willing to be part of the study.

A further reason was its role as a 4th Party Logistics Company. Only 3% of the respondent companies indicated that they were 4th Party Logistics companies and therefore Company E had the potential to provide a different viewpoint on horizontal collaboration. As a company that provides packages of solutions based on other companies' services rather than its own in-house services, this case gives a very different scope for collaboration than the previous cases. This leads back to the point mentioned in the previous paragraph relating to the lack of joint procurement in the logistics industry due to a lack of physical products being bought, however, in the case of a 4th Party Logistics firm such as Company E, that buy in all its services, there is considerably more scope for joint procurement than for other companies in the logistics industry.

6.8.4 Network Structure

As stated in the previous section, Company E does not own any of its own vehicles or storage facilities, and instead, uses a network of subcontractors and partners to offer a full range of services. Its solutions package for a particular company may involve using a number of partners or subcontractors as illustrated in Figure 6.42.

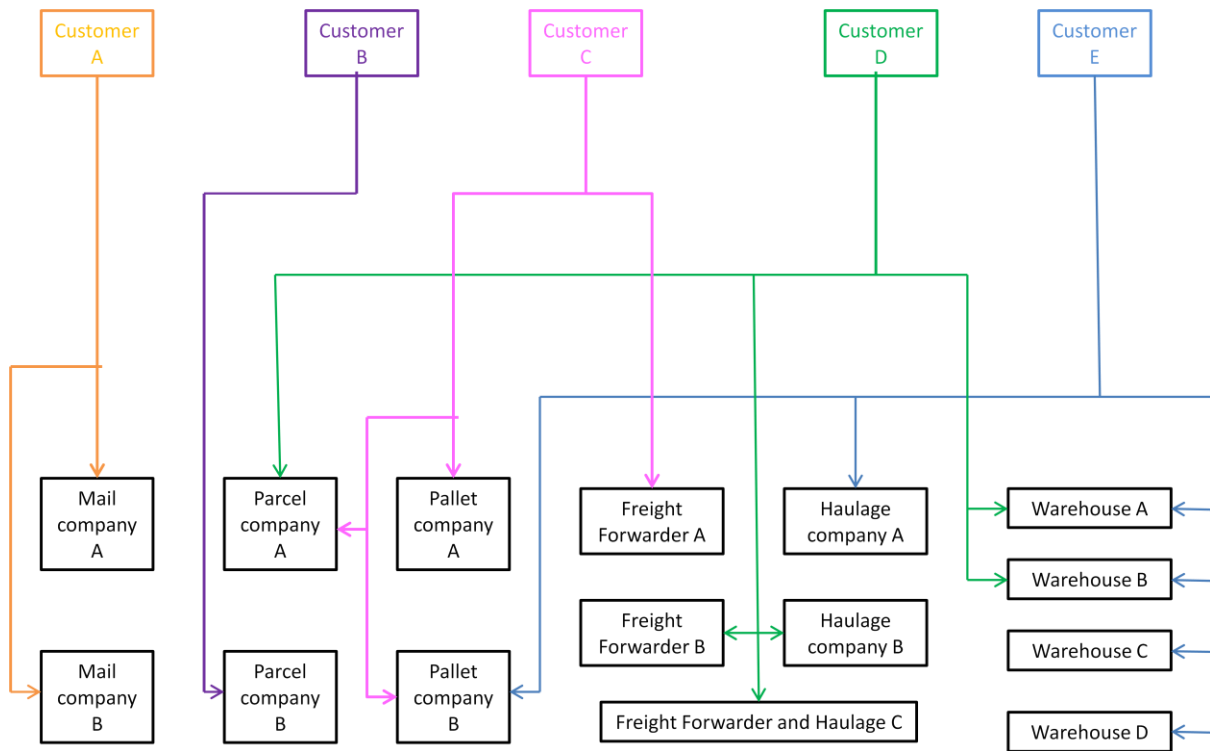


Figure 6.42: Company E's suppliers involved in providing services for a number of example customers

Figure 6.42 shows a number of example customers and the services they procure through Company E. The majority of Company E's customers utilise Company E to provide them with a number of services from a number of different companies. This allows them to access different types of logistics services in different locations whilst only having to deal with one company, Company E then do all the negotiations, order placement and tracking on the customers' behalf.

In some cases, companies will utilise the services of two companies that provide very similar services, this is common with parcel delivery as one of the main companies offers a more comprehensive set of same-day services, whilst, one of the others offers a larger range of next day delivery services. One of the parcel delivery companies is Company A which was introduced in case study 1. Figures 6.43 and 6.44 contrast the physical shipments' flow and

information flow that occurs when Company A's parcel delivery services are sourced from Company E.

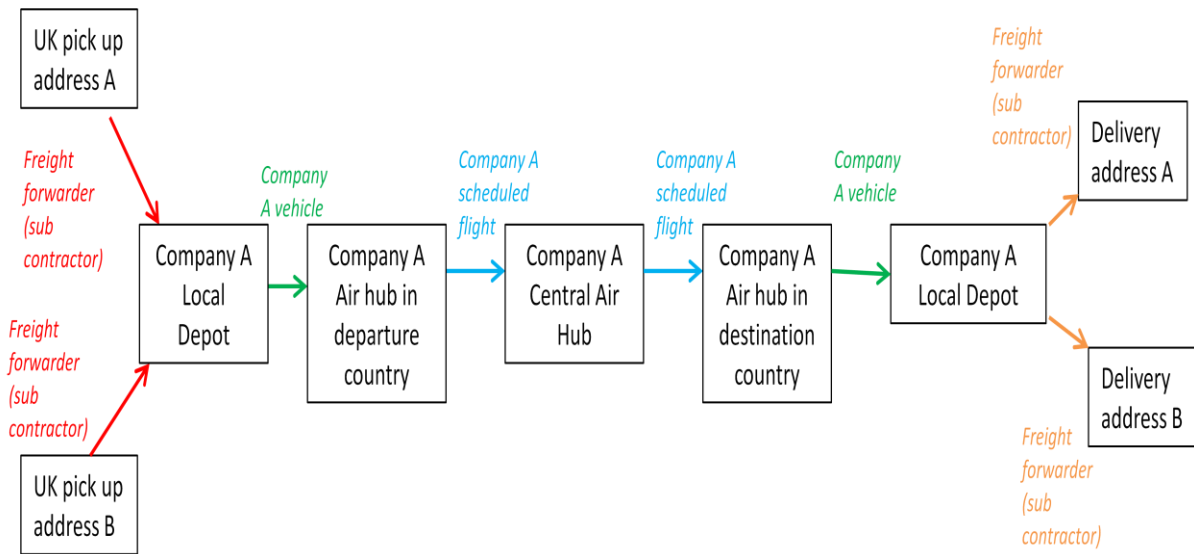


Figure 6.43: Physical material flow

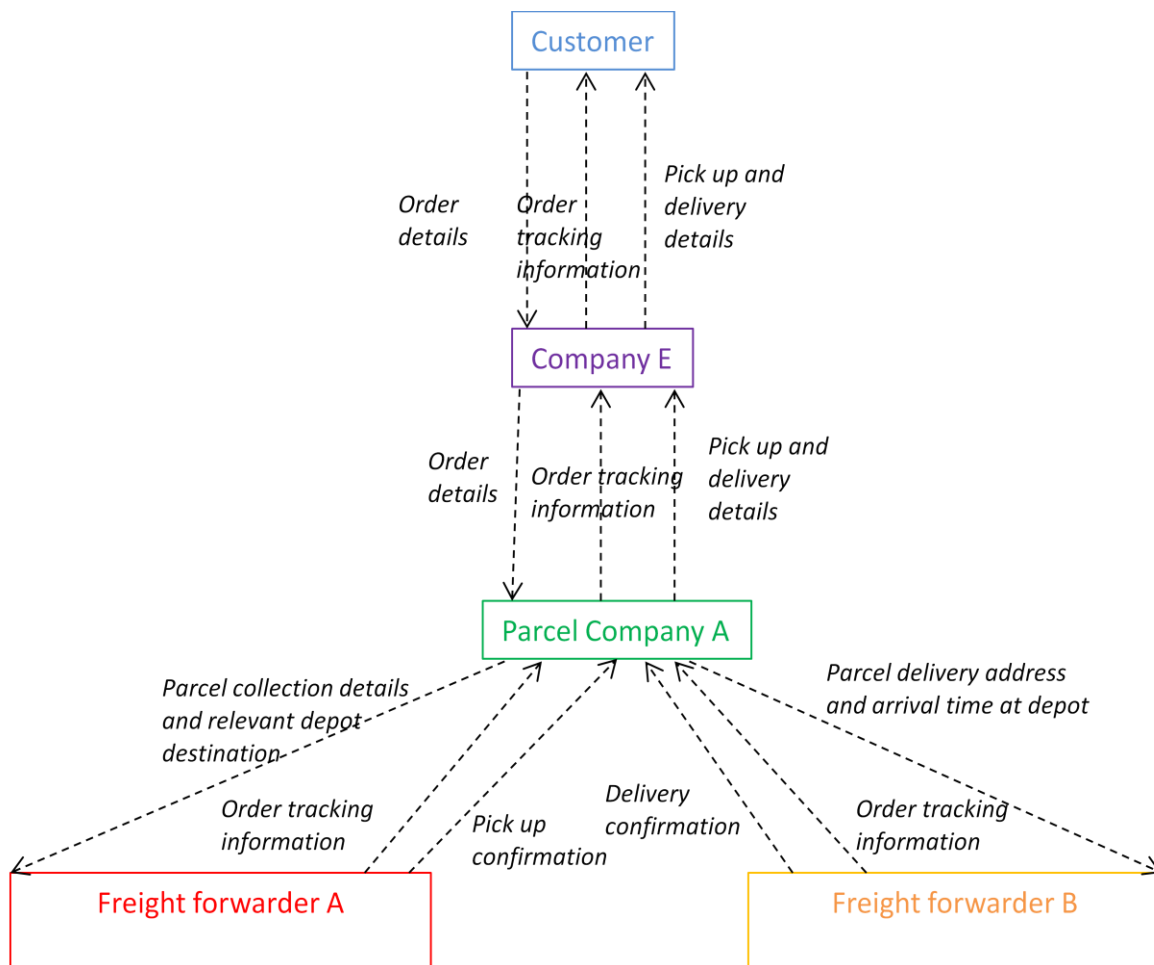


Figure 6.44: Information flow

It can be seen from Figures 6.43 and 6.44 that although the physical product is never handled by Company E, all information to the customer goes through Company E. It receives order confirmation, tracking information and delivery confirmation through Company E. The only interaction the customer has with any other company will be the interaction with the subcontractors that Company A uses to do the first mile and last mile journeys. Delivery tracking information will be taken from Company A's system and used to update Company E's ACE system to allow customers to track its shipments.

6.8.5 General Horizontal Collaboration Advantages

Partnerships of both the horizontal and vertical types are incredibly important to Company E in terms of allowing it to maintain high standards of customer service. It believes the focus it sees in the logistics industry, particularly in the parcel industry, where many sales teams are rewarded for bringing in new customers but not for customer retention, is not the way to survive and grow in the logistics industry. Company E works closely with its customer to fully ascertain its needs and then to provide the customer the ideal solution.

Horizontal collaboration can help them it to do that, as through partnering with other organisations Company E can offer a larger range of services. However, Company E has had difficulty finding partners whose focus on customer service is as sharp as its own. Whilst it finds that the commercial negotiations undertaken to implement a horizontal collaboration project do not take significant lengths of time or a significant amount of resources the practical application can be more difficult with other companies not selling the new services they are offering jointly as discriminately as Company E do leading to lower customer satisfaction levels.

For these reasons Company E has been hesitant about growing its partners or suppliers. Company E has turned down a number of prospective partners, particularly those interested

in offering to share services in terms of parcel delivery, due to the potential partner's lack of focus on customer service as it was perceived that these partnerships would reduce customer satisfaction.

Despite this Company E is growing its collaborations, with projects between Company E and its partners often starting with a focus on one particular aspect of business and then growing into something else. The specific case described here being a good example of this.

6.8.6 Case Description

As mentioned in the rationale section of this case study description, this company was initially approached due to its involvement in joint procurement, which was found to be a rare form of collaboration in the logistics industry. The example of a joint procurement project Company E is involved in, which the contact at the company was most comfortable talking about, has aspects of both joint procurement and shared services, when all partners involved in the collaboration are considered. This case analysis considers the inputs and benefits to all partners to allow a holistic view of the collaboration to be gained.

Company E was already undertaking joint procurement with a number of similar size freight forwarders and 3rd Party Logistics companies within the UK. This joint procurement was within its parcel and pallet service sectors and was undertaken in the form of pooling orders to gain economies of scale when placing orders for services on large pallet or parcel delivery companies such as Company A or Parcel Company E1. These joint purchasing collaborations allow Company E to buy services that account for around 10% of its turnover.

Company E, through its culture of collaboration with all partners in the supply chain, whether they are horizontal and vertical, has in this case managed to gain a new customer consortium on the promise that it will build a platform for the consortium to enable it to undertake joint procurement in purchasing services through Company E and initially Parcel Company E1.

In 2012, Company E was invited to tender for a project which would involve providing parcel delivery for a customer's network of partners all over the world. At the time Company E did a limited amount of work for this customer and this was solely for its UK office. This project involved bringing together all the parcel delivery orders for its network of partners around the world to allow them to use one parcel supplier for all deliveries and therefore through joint procurement obtain a significant saving in the purchasing of these services as well as allowing them to standardise its services.

The customers also invited the large parcel delivery companies such as Company A and Parcel Company E1 to tender for this contract, but whilst there were a large number of customers involved in the consortium, its total business of around 2 million pounds a year, was not high enough to persuade the large parcel companies to get involved with the project. However, the 2 million pound a year existing business the consortium was bringing to the table was enough to attract Company E to enter into talks with the consortium.

Company E's facilitation of this joint procurement scheme has involved the development of a new ICT portal which provides order placing, order tracking and documentation such as invoices and profitability reports to each customer. The system loads the correct information for each individual branch of each partner and allows them to directly print off shipping labels for its required destination. This system was developed off the back of an existing system that Company E had created to allow its existing customers to track its orders on its customer system, Automated Customer Executive (ACE), and with limited assistance from Parcel Company E1 in terms of using its application programming interface (API) pack to help develop and link the system with Parcel Company E1's own order placement system.

ACE is the tracking system that Company E created; it allows customers to easily see the progress of all its deliveries and highlights any potential problems. It can also provide

customers with PODs, invoices, credit notes and monthly delivery performance reports for a 12 month period.

Currently this system places orders on Parcel Company E1 through Company E, allowing Company E to benefit from the business whilst the consortium gains economies of scale. The system can handle multiple currencies and is available in multiple languages.

This portal allows the customer to access a number of different parcel services which range from very fast dedicated services to day specific delivery on scheduled services. The service range is dependent on geographical location and generally the slower the services, the larger the range of places, the service is available to.

6.8.7 Performance Enhancements of Joint Procurement

The main benefits of this collaboration will be seen by the consortium of customers rather than Company E itself, and will be in the form of cost savings due to increased buying power through order consolidation. It will also make them a more important customer to its supplier which may lead to improved customer service. Due to the existing potential for the portal to be expanded to allow existing customers of Company E to use it to place orders, it may also allow Company E to gain these cost and customer service benefits for all its customers and therefore either increase its profit margin and/or increase the competitiveness of its parcel delivery services.

6.8.7.1 Cost-Related Performance Enhancements

In terms of savings by the customer consortium, by placing orders on Parcel Company E1 as one entity, they will be able to access Parcel Company E1's frequent user discount. Some of the consortium is already placing enough orders to obtain some level of discount but Parcel Company E1 operate a number of different discount levels and currently none of the consortium are sending enough shipments to qualify for the highest levels of discount. By

purchasing as one entity it is able to obtain at least Parcel Company E1’s highest published level of discount and possibly even get a better rate if the shipment levels are significantly over those to qualify for the top published discount. Parcel Company E1’s discount criterion is shown in Table 6.25.

Shipments sent during the month	Discount per shipment (£)
0-3	0
4-6	3
7-10	4
11-15	7
16-25	8
26-40	9
41-60	10
61-100	11
>100	12

Table 6.25: Parcel Company E1’s discount rates (Parcel Company E1, 2012b)

The consortium believes that between them they will be sending over 100 shipments a month giving them a £12 discount on shipments. If between them they send 101 shipments that will give them an overall discount of £1212 per month or £14544 per year, which on a £2 million order book gives a saving of around 1%, but some companies will see a bigger saving than others depending on the volume of shipments they were sending and the discount level they were obtaining already.

The consortium believes that this joint procurement strategy will allow them to maintain the top level of discount for all the companies throughout the year. Currently some companies are receiving different discount levels in different months due to fluctuations in demand. Due to the different consortium members experiencing peak volumes at different times and the high overall volume, this fluctuation of discount should not occur.

For Company E, the facilitation of this joint procurement project has been the major source of the £100, 000 they have spent this year on ICT this year, but with a return estimated at around 2 million pound per year in orders over a 2 year period this project should directly earn the costs back 40 times just through the business provided through the consortium.

In addition to this, Company E1 believes that it will be able to grow its annual revenue by 13-15% by 2015 and are expecting to see significant growth in revenue in the short term due to a suspected loss in customer focus at Company A whilst the merger with Competitor A1 is being undertaken and operating procedures and services are standardised (Wright, 2012).

Company E is hoping that the increased business in parcel delivery it will obtain through the use of this platform will allow it to re-negotiate its current rates with Parcel Company E1 allowing it to obtain further discounts for all its customers.

6.8.7.2 Efficiency Related Performance Enhancements

The customer consortium through this project gains a standardised way of placing orders, thus increasing the overall efficiency of its businesses. It also consolidates all its orders on to one supplier meaning increased efficiency as less time and money will be spent on negotiations with suppliers.

Company E hopes to build on this standardised platform to allow all its customers to place its orders this way, allowing them to use a single system for all customers of that particular supplier and potentially other suppliers. This will simplify its operations significantly, which will lead to time and money saving efficiency savings.

6.8.7.3 Customer Service-Related Performance Enhancements

The CEO of Company E believes that the complexities of developing ICT and management systems for joint procurement projects are the main barrier stopping companies becoming

involved in these sorts of projects. Company E is hoping that by facilitating this for its customers they may increase the business they do with them.

Whilst this new system was put in place for one specific set of customers, Company E is hoping that it will be able to use the system it had developed to allow the consortium to undertake joint procurement to attract new customers through the advantages the new system will give customers, the simplicity of use, the holistic nature of the system and the ability of Company E to pass on savings to the customer through the amalgamation of all orders placed on the system and therefore obtaining bulk buying discounts from the suppliers of the services.

This will be targeted at small to medium-sized companies which buy these types of parcel delivery services but do not have the resources or the order volumes to set up similar systems or negotiate deals with the large service suppliers such as Parcel Company E1. With more companies joining the collaboration, there is the potential for further discounts to be negotiated with suppliers.

Company E is also hoping that this platform can be adapted to allow it to consolidate its own customer's orders for parcel delivery more easily, in order to obtain the services it needs at the best price. Company E is in the future, hoping that the system can be built on to allow it to use it to place orders on hauliers in addition to parcel companies.

6.8.7.4 Flexibility-Related Performance Enhancements

Company E has tried to develop the system so that it is flexible and can be used for multiple suppliers and customers. As mentioned previously Company E is hoping to migrate some of its existing customers over to the new system and believe it can link this to ACE, its existing order tracking system. Its involvement in this project has allowed it to create a new system

with the security of guaranteed business to go through it, whilst allowing it to develop a system that can potentially improve the customer service for its existing customers.

6.8.8 Performance Enhancements in Relation to Indicated Key Drivers

The drivers for horizontal collaboration that were indicated by Company E's responses were the accessing of new markets, the reduction of transport costs, the enhancement of customer service and the reduction of administrative costs.

It has been seen that this form of collaboration has focused on reducing costs and enhancing customer service, by allowing customers to jointly procure services through Company E thus allowing them to obtain a higher level of discount from the supplier. This has improved the level of customer service they are obtaining from Company E as well as reducing its costs. As the volume of parcels being sent can potentially be added to the volume Company E already places for its customer, it is also possible that in time this venture will lead to cost savings for Company E as well as the customer.

6.9 Chapter Summary

This chapter had discussed, individually, seven case studies. These will be compared and contrasted in the next chapter. These cases have shown the different ways horizontal collaboration has been implemented in different sizes and types of logistics companies.

- Case one showed two large parcel companies implementation of freight consolidation to cut cost whilst retaining services.
- Case two illustrated how a small freight forwarders implementation of freight consolidation allowed it to service wider geographical markets more efficiently.
- Case three demonstrated how a larger parcel company has achieved increased efficiency in terms of fill rates through a code sharing and route sharing partnership.

- Case four concerned a small freight forwarding company's introduction of a shared route to reduce costs and reduce empty running miles.
- Case five showed how a large parcel company has benefitted from a joint venture programme that allowed them to enter a new market with lower costs and risks than could have been achieved if it had entered the market alone.
- Case six was shown from a different point of view and illustrated a customer led joint venture.
- Case seven concerned the joint procurement programme being set-up at a small 4th party logistics firm and the business it has gained through this.

CHAPTER 7

DISCUSSION

7.1 Chapter Introduction

This chapter focuses on analysing, the results from the different empirical stages of the research comparing and contrasting them with the pertinent prevailing knowledge, theory and application and related contributions described in the literature review in chapter two. This chapter starts with a discussion of the questionnaires and then continues into an inter-case analysis section, comparing the two cases for each of three main types of horizontal collaboration. The chapter then continues with a general discussion on the differences between the types of collaboration and presents a set of guidelines that illustrate how each type of collaboration can be successfully implemented.

7.2 Survey Analysis

This section discusses the results obtained in the questionnaires, but also, where relevant, draws on the information gained from the case studies.

7.2.1 Company Classification

Prior research into horizontal collaboration such as Mesquita and Lazzarini (2008) suggested that SMEs potentially could gain more benefits from horizontal collaboration than larger companies. However, Cruijssen et al. (2007a) and Bleeke and Ernst, (1995) concluded that the barriers to horizontal collaboration are significantly higher for smaller companies. This study has shown that the smallest companies were least likely to be involved in collaboration with direct competitors. This was also a finding of Cruijssen et al. (2007). This finding was partially explained by the fact that smaller companies are likely to operate in niche markets where collaboration is more difficult.

Moreover, this study also showed that the perceived effectiveness of horizontal collaboration is not affected by the size of the company, suggesting that if horizontal collaboration is more difficult to implement for small companies, if it is implemented, small companies see higher performance enhancements than larger companies which would then account for the similar rating.

Literature on collaboration in the logistics industry showed that freight forwarders could use horizontal collaboration to compete with 3PLs (Zhang et al., 2007), whilst 3PLs could use horizontal collaboration to compete with 4PLs (Carbone and Stone, 2005). This would perhaps suggest that 4PLs are the least likely type of company, in the logistics industry, to be involved in horizontal collaboration. The results from this study do not directly support this statement with 70.0% of 4PLs indicating that they are collaborating with competitors compared to 62.7% of 3PLs and 64.9% of freight forwarders.

There are a number of factors that could explain this; firstly, generally the respondents that indicated that they were 4PLs were larger companies, which were shown to be more likely to be involved in collaboration. Secondly, it was shown in cases six and seven that customers can affect a logistics company's involvement in horizontal collaboration. The larger companies are likely to service larger customers which will have more power to insist their logistics suppliers collaborate. In addition to this, case seven showed that the respondent considered the company to be involved in collaboration with direct competitors because the company facilitated the collaboration of some of its competing customers. 3PLs and 4PLs are more likely to be able to offer to facilitate collaboration as they are likely to handle all of their customers' supply chain needs rather than isolated sections.

7.2.2 Drivers and barriers to Horizontal Collaboration

Table 8.1 illustrates the rankings of the drivers to collaboration found in this study and compares them to whether they were identified in five key papers that considered the drivers for horizontal collaboration in the logistics industry.

Ranking		1	2	3	4	5
1	Reduce transport costs	X	X	X		
2	Enhance customer service	X	X	X		X
3	Access to new markets	X		X	X	X
4	Improve vehicle fill utilisation		X		X	
5	Allow for easier response to demand fluctuation				X	
6	Reduce procurement costs	X				
7	Reduce administrative costs					
8	Reduce storage costs		X			
9	Lower carbon emissions		X			

1 = *Crujssen et al., (2007a)*, 2 = *Eye for Transport (2012)*, 3 = *Lydeka and Adomavicius (2007)*, 4 = *Ergun et al., (2007)*, 5 = *Bernal and Johnsen (2002)*

Table 7.1: Comparison of drivers for horizontal collaboration

Table 7.1 shows that the most often cited drivers for horizontal collaboration, the enhancement of customer services and accessing new markets were only the second and third most popular drivers indicated by the respondents in this research, with the reduction of transport costs being the most popular response. From this it can be determined that the most widespread use of horizontal collaboration in the logistics industry, is as a defensive mechanism to allow companies to decrease costs. Given the high percentage of companies also indicating that enhancing customer services was a driver to horizontal collaboration and the responses gained from the freight consolidation and shared services cases, it can be seen

that companies in the logistics industry are having to collaborate to allow them to offer a sufficient range of services at a reasonable cost to their customers.

Table 7.2 illustrates the rankings of the main barriers to collaboration found in this study and compares this to whether they were identified in three key papers that considered the barriers to horizontal collaboration in the logistics industry.

Ranking		1	2	3
1	Competitors gaining access to sensitive customer information		X	X
2	Lack of trust		X	X
3	Difficulty in finding partners	X	X	
4	Loss of closeness to customers		X	
=5	Difficulty agreeing terms and conditions of the project	X		X
=5	Lack of common processes and systems	X	X	X
7	Hard to estimate the savings of the collaboration in advance	X		
8	Limited precedence of examples of similar initiatives		X	
9	Management unsupportive of such projects		X	
10	Difficulty in planning what happens at the end of the project			X

1 = *Cruijssen et al., (2007a)*, 2 = *Eye for Transport (2012)*, 3 = *Lydeka and Adomavicius (2007)*

Table 7.2: Comparison of barriers to horizontal collaboration

The only barrier cited in each of the three papers was lack of common processes and systems, which was only fifth in this survey. This could be because many potential collaborations never get as far as considering whether they have the common processes and systems as, due to lack of trust, negotiations never mature into a collaboration. This indicates, that whilst a

lack of common processes and systems is one of the leading causes for collaboration failure, lack of trust and fear of competitors accessing sensitive information are leading causes of companies avoiding involvement in horizontal collaboration.

Difficulty in finding partners has been cited as a major problem in the literature and has been identified as an issue for around one third of companies, with finding a partner with a similar focus having been the deeper issue identified by the interviewees in the case studies. Companies want to ensure that horizontal collaboration will not negatively affect their relationships with their customers or, as indicated by one quarter of the respondents, their closeness to their customers.

7.2.3 Maturity of Horizontal Collaboration Practices

The results of the questionnaire and follow-up questionnaire illustrated that horizontal collaboration was a mature practice within the logistics industry with 49% of companies indicating that they had been involved in horizontal collaboration for more than five years and 9.8% indicating that they had been involved in horizontal collaboration for over 20 years.

The Eye for Transport report (2010) on horizontal collaboration in the logistics industry showed that the majority of respondents believed that horizontal collaboration would become widespread within the logistics industry within 3 years. The Eye for Transport survey was carried out in 2009 and the survey carried out in this research was undertaken in 2010. The large percentage of respondents indicating an involvement in horizontal collaboration coupled with the length of time respondents stated that companies had been involved in horizontal collaboration illustrated that by 2010 horizontal collaboration had become a wide spread practice in the UK.

The Eye for Transport report did consider a wider geographical area, Europe. This indicates that either horizontal collaboration became wide spread quicker than the respondents to the

Eye for Transport review anticipated or that horizontal collaboration in the UK Logistics Industry is more widespread than in other places in Europe. With the main driver for horizontal collaboration having been shown to be the reduction of costs, there is a potential reason for horizontal collaboration in the UK logistics industry being more widespread than other parts of Europe: this is the high cost of diesel fuel. According to an AA report in 2012, the UK had the second highest diesel costs in Europe (AA, 2012); higher prices for a major commodity in the industry can explain the increase in the level of uptake of horizontal collaboration.

Harrington (2008) estimated that the percentage of the total cost of running a road freight service attributed to diesel had increased to 40% in the USA in 2008. Currently the price of diesel in the USA is only around 46.8% of the price of diesel in the UK, assuming Harrington's estimation is correct, with higher diesel prices UK logistics companies, that offer some level of road haulage services, will have had to find new ways to make services cost efficient. This study indicates that horizontal collaboration is one of these.

7.2.4 Partner Attributes

A large number of studies have considered the attributes companies should look for in a potential horizontal collaboration partner. Chan and Prakash (2011) suggested that companies need to have a common goal for horizontal collaboration to be successful. The cases undertaken in this study do not all support this and agree more with Chakravarty and Zhang's (2007) idea that the companies need complementary expertise and goals. The cases that oppose Chan and Prakash are the first case where Company A was aiming to reduce fixed capacity whilst Partner A1 was aiming to increase its fill rates, and case five where Company A was aiming to enter a new market and the Post Office in Company A3 was aiming to increase its services to its existing customer services.

Gulati (1995) found that companies were more willing to collaborate with partners that could demonstrate can show that they had been involved in a similar form of collaboration previously. The case studies also found this. In each of the cases considered, the focal companies chose to collaborate with companies already involved in horizontal collaboration. In the case of the customer-led joint venture, this was not a factor that the customer considered when choosing the partners. However, in cases where the collaboration is being led by an outside partner such as a customer, this is unlikely to be as important as the outside partner will provide the leadership and facilitate the negotiations.

Oke and Idiagbon-Oke (2010) proposed that horizontal partnerships are less likely to be asymmetric than vertical relations with it being unlikely that companies would be willing to collaborate with direct or even potential competitors if they thought the other company held the majority of the power in the collaboration. However, the freight consolidation case studies, particularly case study one showed an imbalance of power in the relationship with Partner A1 not guaranteeing Company A any volume level on its flight. Company A decided that due to the low volumes on this route and the potential cost reductions that this was an acceptable risk.

The initial questionnaire showed that in 43.7% of cases, generally, the partners a company was collaborating with were larger than the respondent company. Analysis of the follow-up questionnaire demonstrated that collaborating with a larger company was perceived as being more effective than collaborating with a company of the same size or a smaller company. A number of studies such as Lane et al., (2001) suggested that horizontal collaboration could allow companies to learn from one another. Cruijssen et al. (2007b) reported their study on logistics collaboration that larger companies were more efficient, meaning smaller companies can learn more from collaborating with larger partners.

Reniers et al. (2010) produced a hierarchy of factors necessary for collaboration, which was discussed in the literature review. Their hierarchy is consolidated in Table 7.3.

Factor Type	Factor	Score
Soft factors	Openness between companies	0.86
	Trust	0.81
	Cultural fit between companies	0.71
	External willingness to collaborate	0.55
Hard factors	Necessary investments for collaboration	0.80
	External knowledge	0.75
	Market position – relative bargaining power	0.66
	Benchmark results concerning potential partners	0.61
	External financial position	0.57
Independent factors	External innovation potential	0.78
	External flexibility	0.77
	Level of supplementary/complementary potential	0.59

Table 7.3: Horizontal collaboration success factors (adapted from Reniers et al., 2010)

Reniers et al. (2010) showed that openness between the companies is the most important factor for collaboration. Whilst this has been necessary to some degree, the freight consolidation and joint procurement cases analysed in this study have shown very loose relationships which have not required considerable levels of information sharing. Cultural fit has also been shown not to be highly important for some forms of collaboration particularly joint ventures, with the level of supplementary/complementary potential, one of the lowest factors in the model having been shown to be highly important in all cases. The freight

consolidation cases required either complementary geographical networks or complementary levels of freight, the shared services cases required the use of supplementary resources on a shared route, whilst joint ventures required complementary resources, with the exception of joint procurement, the companies must have a resource, volume level or market access that the other company requires or could improve its service.

Market position has been shown to have a higher impact on the effectiveness of horizontal collaboration than that suggested by Reiniers model, as discussed previously, collaborating with larger companies with higher market positions is more popular and effective.

External willingness to collaborate also has a lower score than this study would suggest, with all the case study examples choosing not only a willing partner but one with a proven track record in horizontal collaboration.

7.2.5 Summary of Survey Analysis

Table 7.4 provides an overview and summary of the main findings from the survey stage of this research.

Survey	Findings
Initial questionnaire	<p>The majority of logistics companies in the UK are involved in horizontal collaboration and around half of those have been involved in horizontal collaboration for more than 5 years.</p> <p>Small companies are less likely to be involved in horizontal collaboration than larger companies.</p> <p>The three main barriers to horizontal collaboration are to ‘reduce transport costs’, ‘enhance customer service’ and ‘access new markets’.</p> <p>The two main barriers to horizontal collaboration are ‘lack of trust’ and ‘competitors gaining sensitive company information’</p> <p>The majority of companies are collaborating with multiple partners.</p> <p>Companies are very open to horizontal partnerships where the partners are unequal in terms of size.</p>

Follow-up questionnaire	<p>Despite horizontal collaboration being less popular among smaller companies, the perceived effectiveness of horizontal collaboration is not influenced by the size of the focal company.</p> <p>Joint ventures are perceived to be the most effective type of collaboration, whilst “warehouses belonging to the respondent’s company” was seen as the most effective type of resource sharing.</p> <p>The perceived effectiveness of horizontal collaboration is significantly affected by the relative size of the companies, with collaborating with larger companies perceived to be more effective.</p> <p>Consolidation of complementary freight is likely to be undertaken with a high number of partners, whereas the majority of shared services, joint procurement and joint venture projects have less than ten partners.</p> <p>Despite the high perceived effectiveness of joint ventures, companies involved in joint ventures are the most likely to believe their involvement in horizontal collaboration will decrease in the next five years.</p>
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Table 7.4: An overview of the main findings from the survey research

7.3 Inter-case Analysis

This section focuses on identifying similarities and differences between the types of collaboration as seen in the case studies, to allow generalisations to be made about the types of collaboration and the differences between them in terms of partner types, motivations, benefits and timescales. This will be done firstly by comparing the paired cases for each of the first three types of collaboration and then by comparing the generalisations that can be made.

7.3.1 Consolidation of Freight

The two consolidation of freight cases were undertaken in very different environments in terms of focus of the respective companies. Company A was a large parcel delivery company whereas Company B was a small freight forwarder. However, similarities were seen between their choices of partners, not in terms of the partner companies being similar to each other,

but in the fact that both companies chose to collaborate with partners with similar characteristics to their own company.

Company A collaborated with another express delivery company, with a similar market share in Europe, whilst, Company B collaborated with another freight forwarding company that mainly dealt with road freight in Europe, but that had a different geographical area of competence. Both companies chose to collaborate with companies offering very similar services to the same markets, but whose focus differed slightly to its own. Company A has been focusing on decreasing the number of aircraft it has in order to concentrate on road freight, whereas Partner A1 is increasing its number of aircraft. Company B's geographical focus is on its local area of north England whereas Partner B1 focuses on West Germany.

Company B collaborated with a company of a similar size, whilst, Company A collaborated with a considerably larger company, with Company A's revenue for 2011 being 7252 million Euros compared to Partner A1's 52,829 million Euros. However, Company A's main operations are Express Mail whereas Partner A1's business consists of two other major units. When Company A and Partner A1's revenues in the sector, affected by the horizontal collaboration are considered, a closer match is seen. This is illustrated in Table 7.5.

Revenue Sectors	Company A (million Euros)	Partner A1
Europe and MEA	4525	4960
Asia Pacific	1797	3718
Americas	467	1887
Other	463	351
Overall	7252	10916

Table 7.5: Revenues for Company A and Partner A1

Table 7.5 shows that Partner A1 has a higher overall revenue for the express sector but that this gap narrows significantly in the Europe and MEA sector, which is where this

collaboration is taking place, where the difference in revenue between the companies is only 8.8%.

The questionnaire analysis showed that companies were more likely to collaborate with larger companies and were likely to gain more significant benefits from collaborating with a larger company. The freight forwarding cases show collaboration with similar-sized companies. In the case of Company A this was due to the fact the collaboration was based on airfreight infrastructure provision and only the largest logistics companies are able to provide this. In the case of Company B, its horizontal collaboration partners tend to be of a similar size as this leads to better fit between the companies, as the companies are likely to be undertaking the project for similar reasons and lessens the chance of one company exerting power over the other company.

This suggests that freight forwarding is most likely to be successful where the companies have a considerable amount of similarities but have slightly different focuses or competencies in the area of collaboration. This potentially gives the companies a high level of synergy allowing them to work together, whilst, there is still a significant level of difference between the companies, lessening potential conflict and allowing the collaboration to be beneficial.

The two focal companies' reasons for collaborating were significantly different; Company B had always operated that particular route using horizontal collaboration as it does not have the resources and the geographical presence to service all the routes its customers require. This is the motivation under which it operates all of its freight forwarding partnerships and is believed to be the motivation behind the majority of its partners' decisions to collaborate. In contrast to this, Company A had the resources to operate this route but chose to collaborate due to low fill rates.

Both companies had a significant track record in horizontal collaboration, with this being neither company's first venture into horizontal collaboration. Both companies rely on subcontracting to fulfil their order book so were used to working with competitors before they become involved in horizontal collaboration projects. Both companies are involved in other freight consolidation partnerships with other partners.

Both the freight consolidation cases are undertaken on an informal basis mainly due to the fluctuating demand on the routes, making it difficult for the companies to guarantee their partner a specific volume of orders for that route. Partner A1 did make it clear at the beginning of this collaboration that if its own volume of orders and Company A's volume of orders combined were over capacity of the aircraft, Company A's shipments would not be delivered. Company A does not have a guaranteed fixed capacity on this route, so has risked its ability to deliver to this area on the assumption that neither company will see significant growth in this area.

In contrast to this, Company B's collaboration is on a route that is seeing a significant increase in volumes. This is partially linked with the collaboration and both Company B and Partner B1 are interested in increasing traffic on this route, with the current ratio of Company B to Partner B1's shipments on this route being 65:35. This means that although Company B does not have a guaranteed volume on this route, it feels it can safely grow this market without the volumes becoming too much for Partner B1.

The collaboration between Company A and Partner A1 is a defensive collaboration arrangement, where a collaboration has been formed to allow the partners to operate existing services more efficiently and at lower costs whilst retaining high levels of customer service. The collaboration between Company B and Partner B1 is a more offensive collaboration, as although it has allowed Company B to operate its service to Germany more efficiently; it has also allowed the companies to access new business.

In terms of timescale of the collaborations, both were entered into on an open ended basis, neither have definite end dates and it is simply expected that the collaboration will be reviewed by both parties involved on a yearly basis to evaluate whether the collaboration is still relevant to their business. Whilst Company B's collaboration has already lasted seven years it is likely that Company A's will come to end shortly, as Company A's merger with Competitor A1 is likely to make the collaboration unnecessary as Competitor A1 also runs a flight on this route and it is, therefore, likely that Company A and Competitor A1's shipments will be consolidated, although, if fill rates remain low it is possible that one aircraft could service the route for all three companies.

The main advantage of Company A's collaboration has been the reduction of its fixed volume capacity on a low capacity utilisation route and the reduction of the necessary fixed assets needed to undertake this route, which has led to cost savings and increased flexibility. Company B needed to use horizontal collaboration to operate this route, so the main benefits of the collaboration are customer-service based. The switch to its current partner provided them additional cost benefits due to a decrease in number of partners in the supply chain and decreases in the distance travelled and time taken for delivery. Company B's collaboration is core to its business whereas Company A's collaboration has allowed it to become more efficient.

Considering the other side of the collaboration, Partner B1 and Company B have received some of the same benefits as those received by the focal company. Both parties require a partner in their partner's respective geographical area to allow it to operate this route. In the case of Company B's collaboration, both parties were previously operating the route through other partners but saw potential cost savings and the potential for increasing the volumes on this route through changing partners. However, this collaboration does not give equal benefits for each company with Company B's customers accounting for 65% of the business on this

route. It should be noted, however, that both companies provide some freight for both legs of the journey.

Company A's collaboration provides different benefits to the two companies with Company A reducing its fixed volume whilst Partner A1 increased its fill rate, thus decreasing the cost per unit volume of operating the route. This provides Partner A1 more security in terms of giving it a higher minimum volume level; however, it still has the flexibility to use its full capacity if it receives enough orders as the collaboration does not give Company A1 any level of fixed volume on each flight.

7.3.2 Shared Services

In cases three and four the similarities between the focal companies and their partner companies are solely in terms of size of the company. Company A and Partner A2 were both large multi-national companies whilst Company C and Partner C2 were both small companies with offices located in one single location.

In terms of the focus of the companies, a significant difference is seen in both cases. Company A is focused on express mail delivery whilst Partner A2's focus is on air passenger and air cargo transportation. This means that the companies operate some of the same routes but are not direct competitors.

Company C is a freight forwarding company which focuses on groupage transport and delivery through a network of partners and sub-contractors. Partner C1 is described as a 3PL and offers delivery through its own fleet of vehicles and through its network of partners and sub-contractors. Partner C1 is a much older company, that started as a haulage company and now offers logistics services as well as the original basic transport services and therefore, owns some of its own transport infrastructure, whereas Company C, a relatively new

company in the market, does not own any of its transport infrastructure and concentrates on being able to offer a wide range of flexible services through its partners.

The motivation for both of these collaborations was to reduce the unit volume delivery costs and to reduce overhead and infrastructure costs by only operating half the services on each route and allowing the partner company to operate the other half. In both cases, some sharing of back office systems was needed to allow for the co-ordination of this.

Company C and its partner had a more simplistic model for this collaboration where one company provided the freight for the outbound journey and the other company provided most of the inbound freight meaning the planning and scheduling collaboration between the companies was restricted to days and times of the journeys rather than having to consolidate loads.

In contrast to this, Company A and Partner A1 provide freight for both the inbound and outbound journeys and due to this, the level of back office systems' sharing in this case is significantly more complex. Company A and Partner A2 have a code-sharing agreement allowing the shipments to be consolidated into one planning and scheduling system, so that the companies can see the overall volumes and fill rates for each flight.

In both cases of shared services, the partners the focal companies chose to collaborate with both had significant experience in horizontal collaboration, with Partner C1 displaying an advert for new partners on its website, whilst Partner A1 have been involved in other horizontal collaboration projects including other code sharing collaborations and joint ventures.

In both cases, the collaboration was set up with an indefinite end date, however, as was mentioned in the previous section, the merger of Company A and Competitor A1 could

potentially end existing collaborations, with this partnership being in particular danger due to the decision to sell off Company A's airline operations to secure the merger (Webb, 2012).

The benefits seen by Company A have been increased fill rates on the flights and the increase in frequency of the services they can offer to the customer that has been achieved without the associated reduction in fill rate that would have occurred if they had not worked with Partner A2. Company C has seen a reduction in empty running miles and therefore an increase in overall fill rate on its route and a reduction in its assets used on the route.

Both companies have primarily seen increased fill rates and a decrease in delivery cost per unit volume associated with these. The secondary benefits they have gained have differed slightly, Company C has seen a reduction in fixed asset utilisation by working with Partner C1, whilst, Company A has chosen to redeploy those assets onto the same route on different days to increase the service level it offers to its customers.

In the shared services cases, the benefits seen by the partner companies are the same as the benefits seen by the focal company; the increased fill rate and either reduced fixed assets needed to operate the route or increased services offered. The level of these will differ slightly depending on the comparative percentages of each company's freight on each route.

7.3.3 Joint Ventures

In the two cases of joint ventures studied in this research a difference can be seen in the number of partners in the two joint ventures. Company A chose to collaborate with a single partner whilst Company D had three partners. However, in terms of resources and abilities, similarities can be seen as both companies collaborated with companies with complementary resources and skill sets, to allow them to offer new services. In case 5, this allowed them to offer new services to new and existing customers and in case 6, solely to an existing

customer. In both cases the joint venture allowed the companies involved to grow their business whilst learning from the other company.

As in previous cases all partners in the collaboration had been involved in previous horizontal projects, Partner A3 had previously been involved in joint ventures, whereas the partners in Joint Venture D1 had previously been involved in shared services and freight consolidation.

The most fundamental difference between these two cases is the motivation for undertaking the collaboration. Company A entered into the collaboration to allow it to penetrate a new market with minimal risks and costs, whilst its Partner entered the collaboration to increase the range of services it is offering to its existing customers. The companies involved in Joint Venture D1 also entered the collaboration to increase the services they could offer to their customer; however, in this case, the collaboration was led by their customer rather than by one of the companies involved in the collaboration. This had led to the venture being very customer focused.

Neither collaboration had a definite end date when they were started, however, Joint Venture D1 was sold after eleven years due to diversification of the founding companies and the Joint Venture between Company A1 and Partner A3 is not guaranteed to continue due to a shift in focus of Company A1 due to its recent merger.

7.3.4 Summary of Case Study Analysis

Table 7.6 provides an overview and summary of the main findings from each of the case studies undertaken in this research.

Case number	Findings
Case 1	Case one showed a large parcel companies implementation of freight consolidation which allowed the company to take transport assets off a low freight utilisation route, whilst still operating the route at a lower cost.

- Case 2 Case two illustrated how a small freight forwarders implementation of freight consolidation allowed it to service wider geographical markets more efficiently thus allowing it to offer a broader range of services and therefore appeal to more customers.
- Case 3 Case three demonstrated how a larger parcel company has achieved increased efficiency in terms of fill rates through a code sharing and route partnership, this has allowed them to cut the cost per unit volume and increase the number of services on the route.
- Case 4 Case four concerned a small freight forwarding company's introduction of a shared route to reduce costs and reduce empty running miles on a route where the company had substantial freight on one leg of the route and low volumes on the other leg. Through collaborating with a company with the opposite problem, the overall volume on the route has been increased and each company now only provides the vehicles for half the journeys.
- Case 5 Case five showed how a large parcel company has benefitted from a joint venture programme that allowed them to enter a new market with lower costs and risks than could have been achieved if it had entered the market alone, by collaborating with a national post office. This has allowed the companies to leverage on their complementary skill sets and resources to bring new services to a particular market.
- Case 6 Case six was shown from a different point of view and illustrated a customer led joint venture, through forming a joint venture a number of existing suppliers increased the level of services they could offer to an existing customer.
- Case 7 Case seven concerned the joint procurement programme being set-up at a small 4th party logistics firm, which has allowed the company to gain higher levels of discounts for their existing customers and make their service packages more appealing.

Table 7.6: An overview of the main findings from the case study research

7.4 Analysis of the Approaches to Undertaking the Different Types of Collaboration

This section discusses the findings from the surveys and the case studies that relate to each of the four specific types of horizontal collaboration and how these relate to the literature.

7.4.1 Consolidation of Freight

This survey showed that 47.3% of the overall sample was involved in freight consolidation. The only wide scale survey that demonstrated the percentage of companies involved in freight consolidation was Jackson (1985) which found that 84% of the respondents surveyed were involved in freight consolidation. However, this research did not relate directly to horizontal collaboration and will have included companies consolidating their own freight, for example consolidating to deliver multiple products to multiple customers in one vehicle.

The type of freight consolidation seen in the case studies presented in this thesis can be classified under Pooley and Stenger (1992) models, with case one being an example of network consolidation where a group of shipments are consolidated on a trunk route and then distributed individually from there. In case one, the groups of shipments are defined as Company A's shipments and Partner A1's shipments. These were actually a consolidation of multiple customers shipments, but this was disregarded so as to solely focus on the horizontal nature of the partnership.

Company B's freight consolidation partnership with Partner B1 is slightly more complex and could be described as a combination between shipment consolidation and vehicle routing, where shipment consolidation is undertaken on the trunk route and then vehicle routing is undertaken for pickup and delivery from the local depots. By considering the pickups from the local area for both companies, each company can design the most efficient and cost effective route to pick up and deliver the freight to the local depot and distribute freight from the local depot. Both companies' shipments, plus potentially any other partners' shipments they are carrying are consolidated on the trunk route to allow for full or higher vehicle fill rate.

The main advantage cited for freight consolidation is the reduction of costs, (Wong et al., 2010, Ulku, 2012 and Krajewska et al., 2007). The case studies undertaken in this research have shown that this is true of large companies but for Company B and Company C, (no freight forwarding case was officially done at Company C but the interviewee did talk briefly about the company's involvement in freight consolidation), freight consolidation is an essential tool to allow them to offer a wide range of geographical services, not simply due to it being more cost effective but because it is the only way the companies can afford to run these services, and, in some cases, this still means running these services at a loss. Freight consolidation has become an important and widespread practice in the logistics industry but is crucial to some of the smaller companies service offerings.

It was shown in the literature review that many of the papers on freight consolidation have concentrated on producing mathematical models to show, theoretically, how much money companies could potentially save. In the interviews undertaken in this study, respondents found it very difficult to estimate the savings of the freight consolidation collaborations they were involved in, either because they had not been able to operate the route prior to the company's involvement in horizontal collaboration or simply due to the complexity of the calculation.

To obtain a cost saving for case 1 the delivery cost per unit volume would have to be considered. This would have to account for all overheads including the full costs of running the aircraft on that route including handling, crew, fuel and maintenance. This would have to be compared to the new unit volume cost which would have to include the cost charged by Partner A1 plus the overheads for the collaboration. These would also have to be considered over a considerable length of time, for example a year, due to the high fluctuation of demand in the industry.

7.4.2 Shared Services

When the shared services cases were undertaken in this research it was seen that shared services meant something slightly different to logistics companies than the definition in the literature review. With logistics companies counting services that they operated jointly with a partner as shared services, this is subtly different from freight consolidation as this involves a higher level of back office collaboration and often a more equal partnership. For example, the trunk route service which freight consolidation was undertaken on in case one was solely operated by Partner A1. In case two the freight was delivered to a further partner to complete the journey within a geographical area. However, in the two shared services cases the routes were jointly operated with the two companies operating the service for both companies' freight on certain days of the week or jointly subcontracting the route. In case three this also involved a shared booking system to allow the orders to be consolidated.

Goold et al. (2001) highlighted cost savings and service improvements as the two main benefits to horizontal collaboration. The cases undertaken in this research have shown cost savings and improvements of fill rates to be the most important factors. However, in one of the cases, improvements in the service, in terms of frequency of the service has been improved in the collaboration.

The companies approached about the potential of using their collaboration as a case for the shared services section only showed transportation-based collaboration examples. If logistics companies are collaborating in the back office sectors, as suggested in the literature, such as accounting, customer support and legal services they were not willing to disclose it. It could also be inferred from the data gathered in case seven, that smaller freight forwarding logistics companies might be involved in sharing back office resources through the use of systems provided by the larger 3PLs or 4PLs and may not be aware they are in some ways collaborating with their competitors or potential competitors.

7.4.3 Joint Procurement

Joint procurement was, as expected, found to be an uncommon form of collaboration in the logistics industry. The main motivation for joint procurement seen in the case studies was the reduction of cost per delivery. Literature on this subject considered increased bargaining power to be an additional advantage, however, in the case presented the supplier already has fixed levels at which discounts are achieved and Company E which facilitated the collaboration is unsure whether a level of orders could ever be reached that would increase their bargaining power beyond the existing tariffs.

Literature on the development of horizontal collaboration had shown examples, particularly in the retail industry where joint procurement collaborations had been a company's first attempt at horizontal collaboration and these had then grown into other forms of collaboration. This does not appear to be the case in the UK logistics industry with only 9% of companies being solely involved in joint procurement. If joint procurement was undertaken as the first stage of horizontal collaboration implementation, a higher percentage of companies involved solely in joint procurement would be expected, particularly among companies that have been collaborating for the shortest period of time, only 10% are involved in joint procurement compared to 13.7% overall.

Joint procurement might be the type of collaboration that is most obviously beneficial and that is easiest to implement in other industries. However, these results show that in the logistics industry it is uncommon and that shared services or complementary freight consolidation are more common as the first form of horizontal collaboration companies become involved in.

7.4.4 Joint Ventures

Despite the prevalence of literature on joint ventures, this type of horizontal collaboration was proved to be the least popular in the logistics industry. The literature did show that this was a more difficult type of collaboration to implement due to the high level of formality involved making the collaboration more inflexible. The turbulence and high instances of buy-outs and mergers in the logistics industry are factors that are likely to put companies off entering into such rigid collaborations.

Joint ventures were shown to be most commonly used to access new markets or offer new services, with one company gaining the access to a new market and the other increasing its service offerings, as seen in the joint venture in case 5. The type of joint venture seen in case 6 where local companies collaborate to allow all the companies to increase the services provided to a particular customer has received little attention in the joint venture literature. Nor have joint ventures featured in the literature on customer-led collaboration, indicating that this case could be an anomaly created by the high customer bargaining power and the supply chain conditions found in the automotive industry.

Due to the focus on foreign-domestic joint ventures in the literature, the majority of cases that have been detailed only have two partners, rather than the four seen in case six. The small number of partners involved in joint ventures is normally due to the focus and due to the complexity of the collaboration in terms of scope and intensity, which requires higher levels of collaboration and more complex negotiations, which would be significantly complicated by the inclusion of more than two partners.

Despite this, these case studies have shown that companies are more likely to choose complementary partners in terms of company type and focus than companies involved in other types of horizontal collaboration. This result differs slightly from the expected result,

with joint ventures expected to require the most synergy due to the high extent of this type of collaboration in terms of the assets and processes that would need to be shared. For joint ventures it is more important that companies have complementary aims and resources than that they have the similarities in culture, working practices or goals that are needed for other types of collaboration.

7.5 Guidelines for Successful Horizontal Collaboration

The guidelines shown in Table 7.7 aggregates the information that has been collated throughout this research and presents them as a number of factors which describe each of the different types of horizontal collaboration and can be used to guide successful implementation of the different types of horizontal collaboration.

Factor	Consolidation of freight	Shared Services	Joint Procurement	Joint Ventures
Problem that can be addressed	A low and/or decreasing volume utilisation route.	A low overall volume utilisation route or a low one way utilisation route or a route for which customers want more frequent services but current volume levels mean that additional services are not financially viable.	Order levels below suppliers discount levels.	A market or customer whose needs are not being served that the company wants to serve.
Motivation	Reduce costs on a particular route.	Reduce costs and/or increase service level	Reduce costs and improve efficiency of processes.	New service creation and/or penetration of a new market.
Partner requirements (skill set/ resources)	A partner which runs the same low volume utilisation route and is either willing to take the partner companies' volume at a lower than market price or is willing to pay a reasonable but lower than market price for the partner company to deliver the freight for it.	A partner operating the same route at low volume utilisation or running the same route with opposing full and empty legs. A partner which can provide half the transport and back-office resources for the partnership. A partner whose service levels meet the focal company's	Partners ordering from the same suppliers or willing to negotiate changing to a new supplier. Partner willing to undertake some extra co-ordination activities in terms of placing orders in order to gain discounts.	A partner with a presence in a market the company is not already in or a partner which can offer complementary services to a market that the company is already operating in.

		service level promise.		
Partner requirements (geographic)	A partner with at least one identical route or alternatively a partner which has complementary geographic competencies.	A partner operating in some similar areas.	No geographic requirements.	This is usually undertaken by partners operating in different geographical markets.
Partner requirements (size)	Usually undertaken with similar size partners.	Usually undertaken with similar size partners.	No size requirements.	Usually to be undertaken with similar size partners.
Partner requirements (number of partners)	One individual partner for each route or geographical area.	One individual partner for the route.	A high number of partners to allow the highest discounts to be secured.	A small number of partners to provide all the skills and knowledge needed.
Time scale and formality	Indefinite with informal agreements.	Indefinite with some form of formal agreement in place.	Definite with formal contracts and the potential to renew.	Indefinite with wide reaching formal contracts in place.
Benefits	Cost reductions through the reduction of cost per unit volume. Either increased fill rates on a particular route or a reduction of the transport assets needed.	Higher vehicle fill rates and therefore lower costs per unit volume. Reduction of the transport assets needed due to partner undertaking half of the journeys.	Lower costs per unit product/service procured.	Access to a new geographical market or the provision of a new service to an existing market which widens the customer base and can increase business from existing customers, leading to increased market share. This type of collaboration also has the highest potential for knowledge spill over between the companies due to the companies having different competencies.
Obstacles	Finding a partner with the same number of services on a particular route, often easier to find partners for trunk routes. Finding a partner	Finding a partner with the same number of services on a particular route, often easier to find partners for trunk routes. Finding a partner	Finding enough partners to make the project worthwhile. Reaching an agreement on the suppliers being used. Reaching an agreement on, and	Finding potential partners. Deciding which assets can be utilised by the joint venture company. Setting up the new company including

	with the same commitment to customers and can be trusted not to try and steal customers! Managing the fluctuations in demand for both companies to allow all customer demand to be satisfied.	with a complementary customer base. Finding a partner with same commitment to customers and can be trusted not to try and steal customers. Managing the fluctuations in demand for both companies to allow all customer demand to be satisfied.	implementing a common purchasing procedure.	agreeing on factors such as company structure, procedures and processes. Co-ordinating the flow of information and services between the joint venture company and the parent company. Company diversification has been seen to negatively affect long term joint ventures in their later years.
Risks	Partner may cancel the agreement leaving the company struggling to find the resources to meet customer demand and/or forcing the company to operate routes at a loss. Total freight of both companies may exceed capacity and one/both companies could be forced to put extra vehicles on the route temporarily / permanently at a higher cost.	Partner may cancel the agreement leaving the company struggling to find the resources to meet customer demand.	When the agreement ends, if the company has changed supplier to enter the agreement they may end up with a worse relationship / worse price with the existing supplier than it had with the original supplier.	Due to the long term nature of this type of collaboration, the collaboration's relevance to the company may lessen if the company changes. There is also the potential for the joint venture company to get bought out by one of the partners.

Table 7.7: Horizontal collaboration guidelines

Table 7.7 illustrates a number of fundamental differences between the ways the types of collaboration are being undertaken in the logistics industry. Shared services and joint procurement were seen to be mainly defensive strategies, used by companies to lower costs on existing routes, particularly on routes where significant volume decreases have occurred. Freight consolidation was seen to be used defensively for the large company and simply as

the only way to operate a large geographical network, by smaller companies. In contrast, joint ventures were shown to be a more offensive strategy, gaining the companies involved new customers or allowing them to considerably widen the services offered.

In terms of number of partners, joint procurement showed the highest number of partners involved in an individual project, with companies involved in freight consolidation indicating that they were involved in many projects with a similar focus but each with a different partner.

Different collaborations need different levels of fit with the partners' companies, with joint procurement showing the lowest level of fit and freight consolidation shows the highest level of fit. For successful shared services' implementation a shared route is needed, whereas, for consolidation of complementary freight either a shared route can be used or the companies can utilise their partner's expertise in delivering within a specific geographic area.

As expected, joint ventures were seen to be the most formal type of collaboration with consolidation of freight being undertaken on the most informal basis. The joint procurement case was the only example seen of a collaboration entered into with a fixed duration; all the other cases showed that the collaborations had been entered into with no specific end date.

As well as differences in the way the collaborations are undertaken and the benefits companies obtain from each type, the types of collaboration also differ by the obstacles to successful implementation and the risks associated with it. Consolidation of freight can potentially expose the company to a higher number of risks particularly in the case where the partner company is delivering the freight. Due to this companies should enter into this type of collaboration only when certain that their partner company is equally committed to the partnership. In the case of both freight consolidation and shared services, the company should have a plan for how the route can be serviced if the collaboration fails.

In all the types of horizontal collaboration the agreement on processes and procedures is a major obstacle, partners need to agree on a particular way of carrying out joint tasks and tasks that relate to the joint processes, for example, some level of route and load planning would be needed for consolidation of complementary freight and shared services.

7.6 Chapter Summary

The comparisons of the cases of each individual type of collaboration led to the identification of differences between the types of collaboration in terms of partner attributes, time scales, number of partners and motivation for collaboration.

Relating the general results of this study with the original literature has shown that horizontal collaboration is more widespread in the UK logistics industry than would have been expected from previous studies. It has also shown that despite the prevalence of literature showing how new markets can be accessed by horizontal collaboration and how service levels can be improved, horizontal collaboration is primarily used to reduce costs.

It has also disproved the theory that companies would avoid working with larger companies with more power; it was shown to be both more popular and more effective to work with a larger partner.

The comparison with the original literature has also shown considerable differences between how the types of collaboration are undertaken in the logistics industry and the general models of how they are undertaken.

- A considerable difference was seen in the extent of implementation of joint procurement due to the service-orientated nature of the industry. It was also shown to be a practice associated with companies with mature collaboration cultures rather than being the first step to implementing horizontal collaboration, as suggested in the literature.

- Freight consolidation was understandably the type of collaboration where the most synergy was seen with previous literature, as this form of collaboration is unique to the logistics function.
- The term shared services was shown to have a different meaning to logistics practitioners than its meaning in academic literature. With shared services in logistics referring to transport services that are jointly operated. For example, a trunk route where both companies' vehicles are utilised with some involvement of back office systems.
- Joint ventures were shown to have wider uses than the domestic-foreign ventures which are concentrated on in the literature. Joint ventures were also shown to be the form of collaboration which requires the companies to have higher levels of complementary resources and goals rather than similar resources and goals.

This chapter has also provided guidelines for the successful implementation of the different types of collaboration including information relating to the type of problem each type of collaboration can solve, the partner requirements, the benefits of the type of collaboration, the risks of implementing the specific type of collaboration and the obstacles to successful implementation.

CHAPTER 8

CONCLUSIONS

8.1 Introduction to Chapter

The final chapter of this study contains five main sections which will consider the main research findings of the study, the main contributions of the study to both academic literature and logistics practitioners, the implications of the findings from the study, its limitations and issues and ideas for further research.

8.2 Research Findings

The main findings of this research can be split into a number of categories, which will be discussed individually in this section.

8.2.1 The Application of Horizontal Collaboration in the Logistics Industry

Horizontal collaboration was found to be a wide-spread practice in the logistics industry, with the majority of companies in each size and company type category indicating involvement in horizontal collaboration. A slightly lower level of involvement was found at the smallest company level, whilst the largest companies and 4PLs were most likely to be involved in horizontal collaboration.

Horizontal collaboration was also found to be a mature practice within the logistics industry with 49% of respondents indicating that their company's involvement in horizontal collaboration had started more than 5 years ago and 8.9% indicating their involvement had started more than 20 years ago.

With both the questionnaire and case study analysis pointing to horizontal collaboration being used mainly as a defensive strategy to cut costs, rising fuel costs are likely to have contributed to the increase in implementation of horizontal collaboration.

Horizontal collaboration was seen to be a way of survival for small companies, with it often being the only way they could offer a wide set of services to their customers. Other benefits that have been attributed horizontal collaboration are the reduction of costs, the reduction of fixed capacities, entry to new markets and improved service levels.

8.2.2 The Drivers and Barriers to Horizontal Collaboration in the Logistics Industry

The primary drivers for horizontal collaboration were shown to be the 'reduction of transport costs', 'enhancing of customer services' and 'the accessing of new markets'. This differed from the literature which indicated that in other industries enhancing of customer services and accessing new markets have been the major drivers. This is thought to be due to the rising costs in the logistics industry.

The size of the respondent company was seen to impact the perceived drivers, with more of the smallest companies indicating that the 'reduction of procurement costs' was a driver; the 'reduction of administrative costs' was also generally more popular with smaller companies. The smallest companies were the only category of company to indicate that 'accessing new markets' was a more important driver than reducing costs. The cases showed that this was due to horizontal collaboration being essential to some smaller companies' ability to offer a wide enough set of services to their customers.

'Fear of competitors accessing sensitive information' and 'lack of trust' were the most common barriers with 73% and 71% respectively. None of the other barriers were selected by more than 30% of the respondents. The results also showed that respondents at larger companies believed there were more barriers to horizontal collaboration than respondents at smaller companies.

8.2.3 The Types of Horizontal Collaboration undertaken in the Logistics Industry

Shared services was found to be the most widely implemented type of collaboration, with joint procurement, the most written about type, the least popular. Over half the respondents indicated an involvement in more than one type of collaboration, with shared services the most likely type of collaboration to be undertaken in isolation.

Companies involved in freight consolidation have been shown to have a high number of partners, but these actual partnerships tend to be implemented on a one-to-one basis. Companies will have multiple partners in different geographical regions and will work with each one individually. Freight consolidation has been seen to be implemented as a defensive strategy to allow small companies to operate a full set of services to their customers and by large companies as a cost cutting mechanism.

In the logistics industry the term shared service normally relates to a service that is operated jointly between the two companies with equal resources being deployed from each company in terms of transport infrastructure. This often involves some sharing of back office processes such as planning and can also involve shared booking systems. As with freight forwarding, this tends to be done on a one-on-one basis but companies tend to have fewer partners for this type of collaboration. This was shown to be undertaken to reduce costs and to improve service levels by re-deploying transport assets onto the same route.

Joint procurement was the only type of collaboration that was shown to be usually undertaken with a larger group of companies within a single project. This is due to the need for a considerable volume of orders to be amassed for the savings to be worthwhile. Whilst joint procurement is not a particularly obvious type of collaboration to implement in the logistics industry, it can achieve savings when regular services are being bought by a group of companies.

Joint ventures are also uncommon in the logistics industry due to the high level of formality associated with them. They are primarily used to allow one company to access a new market and the other company to increase its services to its existing customers, although, this research did find a case where the joint venture had been established to increase the companies' services to one particular customer. In this case, companies looked more for partners with complementary resources and expertise than the commonalities in company type and goals seen in the other forms of collaboration. Companies involved in joint ventures were the most likely to be involved in the sharing of back office processes as well primary transportation assets.

8.2.4 The Features of Horizontal Collaboration Partnerships

The most commonly shared resource in horizontal collaboration partnerships was truckloads, with warehouse and pallets being the second and third most popular responses. The largest companies were shown to be sharing more types of resources, with an average of 4.89 compared to 2.51 for the smallest companies.

The majority of respondents indicated that the partnerships they were involved in were medium term, two to five years, with around one third indicating that they were involved in long term partnerships. The case studies demonstrated that the majority of horizontal collaboration projects are entered into with a low level of formal agreements and that most are open ended with no projected finish date. This implies that logistics companies are gaining long-term benefits from working with their partners connected with increased fill rates rather than efficiency improvements gained by learning from the other company, which would mean the collaborations would only show benefit for a certain time period.

The majority of horizontal collaboration projects do not have equal cost and benefit sharing models, with freight consolidation the least likely form of collaboration to be undertaken on

an equal footing, joint procurement the most likely to have an equal cost sharing model and joint ventures most likely to have an equal benefit sharing model.

80% of respondents indicated that they had at least one partner located in the same country, whilst 43% indicated they were collaborating with at least one foreign partner. Consolidation of freight is the most likely to be undertaken with domestic partners, whilst joint ventures are the most likely form of collaboration to undertake with a foreign partner.

8.2.6 The Effectiveness of Horizontal Collaboration in the Logistics Industry

Despite the low levels of implementation in the logistics industries, joint ventures were found to be perceived as the most effective type of collaboration, although the differences between the means for each type of collaboration were not statistically significant.

Other underlying factors that were tested and showed no statistical significance were the type of resource being shared, the size of the company, the number of partners and the length of time the company has been collaborating. The factor that was proved to be statistically significant was the relative size of the partners. Collaborating with a larger partner is perceived to be more effective due to the high level of resources and knowledge it gives the focal company access to.

8.2.5 The Guidelines for Implementing Horizontal Collaboration

The discussion chapter of this thesis presented a set of guidelines for successful implementation of horizontal collaboration. These guidelines illustrate how to implement each of the four main types of horizontal collaboration undertaken in the logistics industry and also illustrates how the types of collaboration differ from each other. These guidelines considered the problems each type of collaboration can be used to solve, the partner requirements and number of partners, the time scale and formality of the collaboration, the benefits of each type of collaboration, the obstacles to implementing each type of

collaboration and the risks associated with the collaboration. A number of conclusions can be drawn from these.

- Consolidation of freight and shared services are used to address low volume utilisation whereas joint ventures are more appropriate to enable companies to offer new services or serve a new market.
- Joint ventures require partners to have complementary resources, skills and/or knowledge sets, shared services require companies to operate the same routes and freight consolidation can be undertaken with partners with the same or complementary competencies depending on the arrangement.
- Consolidation of freight and shared services are normally done with multiple partners but the company works with each company individually, however, joint ventures and joint procurement often have a larger number of partners.
- Most types of collaboration are entered into without a specific end date and joint ventures are the most formal type of collaboration.
- Joint procurement and freight consolidation mainly provide cost reduction benefits, shared services also decreases costs but can also allow for service levels to be improved. Joint ventures should focus more on improving service levels.
- Implementing common procedures is a major obstacle for all types of horizontal collaboration but is least applicable to freight consolidation. Despite the lesser obstacles to the consolidation of complementary freight, this type of collaboration can lead to higher risks, particularly in cases where the freight on a particular route is delivered solely by one partner.

8.3 Contributions of this Study

This section discusses the contributions of this study in relation to the objectives of the study which were discussed in chapter one.

- To what extent is horizontal collaboration being utilised by companies of different sizes and types?
- What are the main drivers and barriers to horizontal collaboration in the logistics industry?

Through a large scale survey this research has identified the level to which horizontal collaboration has been implemented in the logistics industry and the reasons, in terms of both drivers and barriers to collaboration, for this. It has identified patterns of standard horizontal collaboration behaviour in the industry such as types of collaborations implemented, durations of partnerships and number of partners.

- What characteristics of the horizontal collaboration projects or the partners involved contributes to the effectiveness of the collaboration?

This study has also investigated a number of factors that were thought to impact on the perceived effectiveness of the collaboration and has drawn conclusions on which of these factors are statistically significant.

- To what extent are the different types of horizontal collaboration undertaken in the logistics industry?
- How do these types of collaboration differ in terms of characteristics such as number of partners, time scale and formality of the collaboration?

This study has provided guidelines for and a discussion of the different types of horizontal collaboration being undertaken in the logistics industry, as literature had shown that a major gap in the literature concerned the lack of encompassing frameworks for horizontal

collaboration in the logistics industry (Vestrepen et al., 2009). This study has added to the existing body of knowledge and the prevailing theory and incumbent ideas on the different types of horizontal collaboration and their uses by providing case studies detailing how they are being undertaken in different companies in the logistics industry and the performance enhancements that are being gained from each type of collaboration.

This research has also provided a holistic perspective via case studies to allow all aspects of horizontal collaboration to be considered, a perspective that Steinicke et al., (2012) and Schmoltzi and Wallenburg (2012) felt was missing from existing literature. In this study, motivations for horizontal collaboration, partner choice, negotiations, implementation and performance enhancements of the collaboration were considered.

This research has attempted to address the issues raised by Zhang et al., (2008), which suggested that further research needs to be carried out to establish which types of horizontal collaboration are appropriate in different circumstances. This study has identified the benefits and motivations for the types of collaboration, showing the circumstances in which they can be successful and which types of horizontal collaboration are appropriate for different purposes such as cost reduction, the introduction of new routes and the entrance into a new market.

- What are the major performance enhancements of implementing the different types of horizontal collaboration?

The case study research undertaken provided specific examples and quantification of the benefits that companies have obtained through horizontal collaboration and has from this made generalisations concerning the performance enhancements that can be achieved for each type of horizontal collaboration.

8.4 Implications of this Study

This study demonstrates a number of key performance enhancements that can be gained through participation in horizontal collaboration. It has also shown that the majority of logistics companies are involved in horizontal collaboration and that most companies see horizontal collaboration in the industry increasing. The cases illustrated that companies prefer to work with a partner with a successful track record in horizontal collaboration. This implies that companies not involved in horizontal collaboration in the logistics industry need to carefully assess whether they will be left behind as other companies in the industry improve their performance through an increasing number of partnerships with direct competitors and potential competitors.

Horizontal collaboration has been primarily shown to be undertaken to allow companies to reduce costs. With the cost of fuel, a major part of a logistics company's costs, increasing, horizontal collaboration has been shown to be a way companies can reduce costs to allow them to operate routes profitably.

This study also provides an insight that can guide smaller companies or ones with smaller service ranges on how horizontal collaboration can be used to increase the level of services they offer, thus allowing them to compete with larger service providers, as many customers now prefer to work with a single logistics provider.

This study also provides guidance for logistics companies interested in implementing horizontal collaboration in terms of the performance enhancements that can be gained from the different types of collaboration. It also provides guidance on structural formation of the types of collaboration in terms of the normal number of partners, normal duration of the collaboration and formality of the type of collaboration.

Research has shown that different types of horizontal collaboration require different levels of similar and complementary goals, skills and resources. Companies need to carefully analyse their own resources and skills and the goal of the collaboration before deciding which type of horizontal collaboration to undertake. They should then analyse potential partners' goals, skills and resources, in relation to their own resources, skills and goals and the type of collaboration they are considering implementing to ensure a successful horizontal collaboration can be undertaken.

This study has shown that generally collaborating with a larger partner is more popular and successful in the industry. This information should also guide logistics companies in their choice of partners.

8.5 Limitations of this Study

The study findings, however, have a number of limitations; firstly the majority of respondents to the questionnaire and the majority of the case studies were undertaken with UK based companies. Therefore, these results can only be generalised to include companies operating in the UK logistics industry, but it is expected the general thrust of the findings is widely applicable.

Large scale surveys are considered to be a good approach for gaining exploratory information on a phenomenon from a large sample. However, the major drawback to this method is that it is very difficult to verify whether the respondents' answers are truthful and whether they are biased in anyway (Saunders et al., 2003). In addition to this, the follow-up questionnaire had a low overall number of responses making drawing generalisations from this information difficult.

A bias may have occurred in the questionnaire in terms of the willing respondents; respondents whose companies are involved in horizontal collaboration are more likely to

have been interested in the results of the study and were therefore more likely to respond. This may mean that the overall percentage of companies undertaking horizontal collaboration in the logistics industry is less than the percentage shown in this study. There is also the potential for bias in the case studies, with companies more likely to be willing to take part in the case study portion of this study if they could show successful horizontal collaboration implementation, as allowing a researcher to study a failing collaboration could be perceived as showing weakness in the company.

Due to many of the respondent companies indicating that they were involved in multiple types of horizontal collaboration, only tentative propositions could be made in terms of differentiating between the types of horizontal collaboration from data collected in the initial and follow up questionnaire. For example, whilst this study provides a discussion on the general durations of the different types of horizontal collaboration, with many companies involved in multiple types of collaboration these results could be misleading. For example, a company could be involved in a number of long-term freight consolidation projects and one short-term shared services project and therefore the respondent indicated that they were mainly involved in long-term projects. Such a result will have been recorded for both freight consolidation and shared services.

8.6 Issues for Future Research

There are a number of issues for further research that have been raised from this study. Firstly, further cases should be undertaken within the logistics industry to further validate and build on the assumptions made on the different types of horizontal collaboration. This should be undertaken with companies of differing types and sizes for each type of horizontal collaboration. This should also involve further quantitative research to allow the performance enhancements in terms of costs, efficiency, customer service and flexibility to be quantified in each case.

In chapter one of this study a number of factors that are connected to horizontal collaboration were presented and the reasons for their omission from this study was described. Future work should seek to integrate these factors: environmental issues and impact of carbon policies; legal issues in relation to competition laws in the UK, EU and globally; power issues with respect to the relationship between collaborators and the impact of technology and integration of dissimilar IT systems.

This study could also be increased to consider logistics providers in a wide range of countries, to establish whether the high costs of fuel have had significant bearing on the implication of horizontal collaboration in the UK. Whilst other surveys into horizontal collaboration in the logistics industry have been undertaken, in papers such as Cruijssen et al (2007a) and Eye for Transport (2012), no attempt had been in the literature to compare and contrast the collaboration behaviour companies in different countries

Further longitudinal studies should be undertaken to map and analyse horizontal collaboration projects across their life span from negotiations to end of the collaboration, as the full period of the collaboration was only considered in one of the cases in this study. This would allow deeper analysis to be carried out on the benefits of the different types of collaboration and would identify the differences in the timescales of the types of collaboration.

This study showed that respondents believed horizontal collaboration projects with larger partners were more effective than those with smaller companies. This finding should be investigated further by looking at a number of cases with differing size partners and gaining information from all sides of the partnership on the effectiveness of the collaboration.

A further interesting area of study would be a contrast of horizontal collaboration projects that are initiated by one of the partner companies against those that are initiated by customers

of the partner companies. Firstly, to identify the relative level of initiation of the two types of project and then to identify where key differences in these two types of collaboration differ.

This research could also be extended by contrasting the results found in this study, with results of a similar study considering logistics function collaboration between manufacturers and retailers, to see how practices and performance enhancements are dependent on the type of company.

There is also the potential for this research to be used as an initial starting point for conducting research into horizontal collaboration in other industry sectors. This research gives a set of types of horizontal collaboration and definitions for these that could be used in research in other sectors. This research provides an overview of the key issues that surround horizontal collaboration in the logistics industry, these issues are likely to be important in other industries to some extent and could be used to guide research in other sectors.

In terms of lessons that were learned in this research that should be taken into account when replicating this research in other sectors, the definitions of the types of collaboration should be investigated for that specific sector, as the definition of shared services in the logistic industry was seen to differ significantly to the definition used in other sectors. Research into a specific sector needs to be as wide as possible as this research showed that there were some differences in the ways companies of different sizes and types were undertaking horizontal collaboration.

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APPENDIX A – INITIAL QUESTIONNAIRE



Collaboration in the Logistics Industry

Please return this questionnaire to
Miss Lucy Everington
University of Liverpool Management School
Chatham Street
Liverpool
L69 7ZH

We are currently conducting a high profile study into the causes and consequences of Collaboration in the Logistics Industry. This study is focusing on horizontal collaboration which is defined as co-operation between companies that provide the same or similar services. In the Logistics Industry this can take many forms such as the sharing of vehicles or warehouses, collaborative purchasing to gain economies of scale, knowledge sharing, order sharing or the shared use of back office functions.

This study aims to gain insight from a wide range of companies within the Logistics Industry and will be disseminated throughout the UK. If you could take five minutes to fill out this questionnaire and return it to us in the **FREEPOST** envelope we would be extremely grateful. All respondents will receive a copy of the final 'Collaboration in the UK Logistics Industry' report.

Company Name.....
Position in Company.....
Date.....

1) How would you classify your company?

- 3rd Party Logistics company
- 4th Party Logistics company
- Shipper
- Freight Forwarder
- Warehouse/distribution centre operations
- Other, if other please state the nature of the
company.....
.....
.....

2) What was the annual revenue of the company last year (in pounds)?

- Under 5 million
- 5-10 million
- 10-50 million
- 50-250 million
- 250 million – 1 billion
- Over 1 billion

3) Is your company currently (tick all that apply)

- Collaborating with companies that provide the same services - direct competitors
- Collaborating with companies that provide similar services - potential competitors
- At the pilot stage of implementing a horizontal collaboration project
- Looking for partners to collaborate with
- Researching horizontal collaboration
- Observing how horizontal collaboration is being undertaken by other companies in the industry
- No interest in horizontal collaboration (Please still return the questionnaire if this is the case)

4) What do you believe the key drivers encouraging companies in your sector to participate in/consider horizontal collaboration? (tick all that apply)

- Access new markets
- Reduce transport costs
- Reduce procurement costs
- Enhance customer service
- Reduce Storage costs
- Improve vehicle fill utilisation
- Allow for easier response to demand fluctuation
- Lower carbon emissions
- Reduce administrative costs
- Other, if other please
state.....
.....

5) What do you believe are the main barriers for companies in your sector trying to implement horizontal collaboration projects? (tick all that apply)

- Lack of trust
- Fear of competitors accessing sensitive information on business operations
- Difficulty in finding partners
- Loss of closeness to customers
- Limited precedence of examples of similar initiatives
- Difficulty agreeing terms and conditions of the project
- Difficulty of planning what happens at the end of the project
- Lack of common processes and systems

- Hard to estimate the savings of the cooperation in advance
 - Management unsupportive of such projects
 - Other, if other please state.....
-
-

6) If collaboration is taking place, what is involved in this collaboration?

- Bundling of freight flows (complementary)
 - Bundling of freight flows (non-complementary)
 - Shared services
 - Joint procurement/buying groups
 - Joint ventures (new companies created)
 - Other, if other please state what.....
-
-

7) What do you share with companies in these collaborations? (Tick all that apply)

- Truckloads
 - Containers
 - Pallets
 - Warehouses (belonging to other companies)
 - Warehouses (belonging to your company)
 - Forecasting or demand planning information
 - Suppliers
 - Back office resources (administration, customer services, etc)
 - Other, if other please state what.....
-
-

8) For how long has your company been involved in horizontal collaboration?

- Under 1 year
- 1 - 2 years
- 2 – 5 years
- More than 5 years

9) How many companies is your company involved with in horizontal collaboration projects?

- 1
- 2-3
- 4-5
- 6+

10) Are these partners all involved in one project or is the company undertaking different horizontal collaboration projects with different companies?

- 1 project
- 2 projects (but the majority involved in one project)
- 2 projects (of around equal size)
- 3 projects (but the majority involved in one project)
- 3 projects (of around equal size)
- 4 projects or more

11) Do the durations of these projects tend to be

- Short term (a year or less)
- Medium term (one to five years)
- Long term (more than five years)

12) Generally, are the companies that you are involved in projects with

- Larger than your company
- Smaller than your company
- The same size as your company

13) Are the companies in these projects based (tick all that apply)

- Locally
- In the same region
- In the same country
- In Europe
- Anywhere else in the world

14) Are costs shared equally in the project(s)?

- Yes
- No

15) Are benefits equally shared in the project(s)?

- Yes
- No

16) Has your company been involved in a horizontal collaboration project that has ended?

- Yes
- No

17) If yes, why did the collaboration end?

- Collaboration failed
- No mutual benefits
- No benefit to this company
- No benefit to other company
- One/both companies have diversified so project is of no interest
- One partner wanted to collaborate with someone else
- Project came to planned end
- Other, if other please

explain.....
.....
.....

APPENDIX B – EXAMPLE OF A FOLLOW-UP QUESTIONNAIRE

Company Name: XXX (66)



Collaboration in the Logistics Industry

1) You indicated you are collaborating in the following ways, on a scale of -1 to 3 how beneficial is this type of collaboration to your company? (-1=negative effect, 0=no effect, 1 weak positive effect, 2 moderate positive effect, 3 strong positive effect)

Bundling of freight flows (complementary)	-1	0	1	2	3
Shared Service	-1	0	1	2	3

2) You indicated you are sharing the following resources with your partners, on a scale of -1 to 3 how beneficial is this type of collaboration to your company? (-1=negative effect, 0=no effect, 1 weak positive effect, 2 moderate positive effect, 3 strong positive effect)

Truckloads	-1	0	1	2	3
Pallets	-1	0	1	2	3
Warehouses (belonging to other companies)	-1	0	1	2	3

3) Do you have formal contracts in place for the horizontal collaboration ventures you are undertaking?

- Yes
- No

4) Do you believe that your company will in the next five years

- Carry on collaborating as it is currently
- Increase the number of partners you are collaborating with
- Increase the level of collaboration with your partners
- Decrease the number of partners you are collaborating with
- Decrease the level of collaboration with your partners
- Cease involvement in horizontal collaboration projects
- Other.....

5) You indicated you are collaborating in the following ways; how many partners do you have for each collaboration type?

Bundling of freight flows (complementary)	
Shared Services	

APPENDIX C – INTERVIEW QUESTIONS

HC General

- 1) Could you give a brief description of the activities you undertake with your competitors or resources that you share with them?
- 2) How long has each of these initiatives been undertaken for?
- 3) How many partners are involved in each initiative?

Implementation

- 1) For a specific collaboration in terms of x, can you tell us when this collaboration started?
- 2) What prompted the start of this collaboration?
- 3) How did you become involved with the other companies?
- 4) What processes/procedures did you have to change?
- 5) Has the level of collaboration developed over time?

Performance - general

- 1) Could you rank the following four drivers in terms of their importance to your company when you entered this collaboration, lowering costs, increasing efficiency, improving customer service or increasing flexibility?
- 2) Are those rankings the same for actual performance improvements seen?

Costs

- 1) Has this initiative allowed for the reduction of core process costs such as storage costs or transportation costs?
- 2) If so what costs have been reduced and why?
- 3) Roughly how much of a saving is being made?
- 4) Is/was this saving a one off figure or will you continue to save this every month/year? Will this figure increase or stay static?
- 5) Is there any way this cost saving could be increased, for example by collaborating with more partners?
- 6) Has this initiative allowed for the reduction of non-core process costs such as fuel facilities or ICT systems?
- 7) If so what costs have been reduced and why?
- 8) Roughly how much of a saving is being made?
- 9) Is/was this saving a one off figure or will you continue to save this every month/year? Will this figure increase or stay static?
- 10) Is there any way this cost saving could be increased, for example by collaborating with more partners?
- 11) Do you think the cost savings are roughly the same across all the partners in the collaboration?
- 12) If not why?
- 13) Do you have any KPI data or other data that I could use showing how costs have reduced since you implemented this initiative?

Efficiency

- 1) Has this initiative allowed for the improvement in efficiency of core processes such as storage costs or transportation costs?
- 2) If so what processes/resources are being maximised?

- 3) Are these resources yours or the partner companies?
- 4) Is this efficiency increase sustainable?
- 5) Could it be further maximised for example by collaborating in more areas or collaborating with more partners?
- 6) Has this initiative allowed for the improvement in efficiency of non-core processes such as planning, human resources or other back office processes?
- 7) If so what processes/resources are being maximised?
- 8) Are these resources yours or the partner companies?
- 9) Is this efficiency increase sustainable?
- 10) Could it be further maximised for example by collaborating in more areas or collaborating with more partners?
- 11) Do you think all partners in this collaboration have seen the same increase in efficiency?
- 12) If not, why?
- 13) Do you have any efficiency KPI data or other data that I could use showing how efficiency has increased since you implemented horizontal collaboration?

Customer Service

- 1) Have there been improvements to the existing services you provided to existing customers?
- 2) If so what improvements for example lower costs, quicker delivery times?
- 3) Has this initiative allowed you to offer new services to your existing customers, if so what services?
- 4) Were customers inquiring about these services before you began offering them, was this a major driver to your company being involved in this type of collaboration?
- 5) Has this initiative increased the volume of business from your existing customers?
- 6) Has this initiative attracted new customers?
- 7) Why, has it opened up new markets, have new customers come to you due to the increased services or has it allowed your company to bid for larger contracts with your partners?
- 8) Is there any way this improved customer service could be further improved using this initiative?
- 9) Do you think all partners have seen the same improvements in customer service?
- 10) If not, how has their customer service improved if at all?
- 11) How do you measure customer satisfaction?
- 12) Do you have any customer service KPI data or other data that I could use showing how customer service has improved since you implemented this initiative?

Flexibility

- 1) How has this initiative improved your flexibility for example has it allowed you to access for example new modes of transport, new routes, larger network?
- 2) What have you had to give your partners access to in return?
- 3) Is there any way this increase in flexibility could be improved further through this alliance?
- 4) Do you feel that this gain in flexibility is equal across the partners?
- 5) If not why?
- 6) Do you have any flexibility KPI data or other data that I could use showing how customer service has improved since you implemented this initiative?

Future

- 1) In the future how do you think the projects you are involved with will change for example will the number of partners increase or will the level of collaboration increase?
- 2) Do you think you will get involved in new projects, if so do you have any idea what the focus of these will be?
- 3) Going forward what aspect of performance would you most like to use horizontal collaboration to increase?