

Drivers and Obstacles for Innovation in Logistics

Marjolein Caniels¹ Wietse Kooistra² Janjaap Semeijn³

1 Open Universiteit Nederland, 2 Netherlands Armed Forces, 3 Universiteit Maastricht
(E-mail: marjolein.caniels@ou.nl, kooimans@hotmail.com, j.semeijn@mw.unimaas.nl)

Abstract Most firms in today's volatile business environments must innovate in order to stay ahead. While a substantial body of literature has examined innovation and organizational learning in general, this study focuses explicitly on the drivers and obstacles for continuous innovation and improvement in the logistics sector. Logistics is an area that is increasingly seeking ways of adding value through innovation. It has transformed from a primary focus on transportation to offering complete logistical solutions to customers. Excellent logistics services increasingly provide a competitive advantage in the global market. This exploratory work examines factors that drive and impede innovation in logistics. A series of interviews were held with managers from ten different logistics firms in the Netherlands. An additional expert group of four logistics consultancies assisted in validating the findings. Our findings support the notion that the Dutch logistics industry is in a state of volatility. Results suggest that many managers active in this industry lack relevant knowledge and have limited experience with innovations. Especially managers in small and medium, family owned, businesses appear deficient in both knowledge and experience. This study provides new insights into continuous innovation and improvement in logistics, and sets directions for future research. It specifically adds new knowledge to three challenges mentioned in the extant literature: obstacles of innovation, collaborative innovation and innovation in logistics.

Key words collaborative innovation, logistics, continuous improvement

1 Introduction

An area that is increasingly seeking ways of adding value through continuous improvement and innovation is logistics (Soosay and Hyland, 2004). The logistics industry is an example of the development of a vital new service-based industry. It has transformed from the business concept of transportation to that of serving the entire logistical needs of customers. Not only independent logistical firms but also most manufacturing firms need to be aware of the service aspects of the products they present their clients. The service component offers a very good change of gaining sustainable competitive advantage in the hyper-competitive global market. Conversely poor service or a reluctance to innovate offers a fairly good change of losing customers (Chapman, Soosay et al. 2002; Esper et al. 2007).

Although the combination of innovation and logistics is interesting – from both a scientific and a managerial point of view - only scarce empirical evidence exists on continuous innovation and continuous improvement in logistics. The existing literature also suffers several limitations. First, most studies only focus on the factors that stimulate firms to conduct continuous improvement and innovation. Factors that hamper organizations in engaging in innovation and improvement activities have more seldom been the object of study. Second, most researches mainly focus on learning and innovation processes within a single firm, while other literature suggest that there are important advantages to be gained through collaborative innovation; i.e. development of a firms' knowledge base, fresh insight into strategies, markets and relationships (Mohr and Sengupta, 2002) and better financial performances (Jiang and Li, 2007). A third limitation of existing research is that it often concentrates on manufacturing environments, many times equating *innovation* with *product innovation*.

The aim of this paper is to increase understanding of the key drivers and obstacles for continuous improvement and innovation in logistics in European firms. A better understanding of what drives and hampers innovation will offer good opportunities to improve *innovation management* in the future. The objects of study are learning and innovation processes within the single firm as well as in collaboration with other firms. To this end we conducted an exploratory research. The data is collected from ten logistic firms and four consultancies. The data collection involved semi-structured interviews with managers of the logistic firms, interviews with logistics consultants and visits to the logistics firms to observe the operations.

2 Literature

2.1 Innovation and organizational learning

Research literature provides a variety of definitions to describe “innovation”. To give a few examples, Rogers (1997) defines innovation as “an idea, practice or object that is perceived as novel by an individual or other unit of adoption” (p.). Tidd et al. (1997) summarizes the concept of innovation as “the process of turning opportunities into practical use” (p.). More closely related to the general accepted idea that innovation is an important factor for firms in gaining sustainable competitive advantage is the definition of innovation given by Wissema (2005), innovation is “the successful introduction of something new. Successful as shown by the acceptance in the market or other use” (p.).

In the academic literature on innovation a clear distinction is made between continuous (incremental) innovation and radical innovation. Continuous innovation is the ongoing, step by step form of innovation whereas radical innovation is about major changes as for example the shift from piston aircraft engines to turbojets, the change from steam to diesel electric locomotives and the move from hard-disc memory to semi-conductor memory (Utterback and Kim 1985; McDermott and O'Connor 2002). Incremental innovation is characterized by low market uncertainty and low technological uncertainty. Radical innovation on the other hand is characterized by high market uncertainty and a high technological uncertainty (Lynn and Akgún 2001). The type of innovation used in this study is consistent with the concepts of continuous (incremental) innovation.

General agreement exists about knowledge management and organizational learning being determining factors in innovation (Nonaka and Takeuchi 1995; Johannessen, Dolva et al. 1997; MacDonald 1998). According to Tidd (2001) innovation is about generating, capturing, sharing and exploiting knowledge, creating new possibilities through combining different knowledge sets. Darroch and McNaughtan (2002) demonstrated the often suggested connection between innovation and knowledge (management). They showed that there is a positive and significant relationship between knowledge management and innovation performance. The relationship between innovation and knowledge (management) has motivated researchers to approach the concept of innovation from a learning and knowledge point of view. The tight connection between innovation and knowledge (management) can also be found in the later discussed research into drivers and obstacles of innovation. Some examples are the influence of a (learning) culture, the quality, skills and knowledge of personnel and information technology to gather, process and distribute knowledge.

The interest for organizational learning and knowledge management dates back to the pioneering work of Cangelosi and Dill (1965). In the seventies learning in and learning by organizations became a popular research topic (Argyris and Schon 1978; Jelenik 1979; Hedberg 1981). In the years following, the interest kept on growing as can be easily determined by the vast amount of papers, books and even dedicated journals published. Not only the interest of academics for innovation and organizational learning grew rapidly also more and more practitioners showed their interest in these concepts. They began to consider innovation as a fundamental component of entrepreneurship and a key element of business prosperity (Nonaka and Takeuchi, 1995). Businesses worldwide experienced the internationalization of technology-driven competition, globalization of manufacturing, shorter product life-cycles, increasingly sophisticated customer needs and a greater integration of technologies (Shepherd and Ahmed 2000). Merely producing the same products more efficiently turned out not to be sufficient anymore. To stay ahead in the market business organizations needed and need to innovate to improve their competitiveness (Chapman, Soosay et al. 2002; Soosay and Hyland 2004).

2.2 Collaborative Innovation

Internationalization of markets, increasing complexity of new technologies and increasing speed of innovation are some of today's market characteristics that make competition hard at the single company level. This situation stimulates the interest of firms for the design and management of interactions among companies (Douma 1997). As a result a wealth of theories on interaction between companies has been developed in the last decade, including fundamental contributions such as transaction cost economics (Coase 1937; Williamson 1973) and network theories (e.g. Håkansson 1989). This wealth of theories also led to a wealth of terminology used to describe the interaction between firms: networks of companies, virtual organizations, customer-supplier collaboration; extended (manufacturing) enterprises, dynamic networks, strategic alliances, and joint ventures are just a few among the interrelated concepts and terms that have been introduced in the various management theories (Chapman and Corso 2005).

Inter-company collaboration for radical innovation is common for many firms. Joint development and co-design are the most typical forms of networking for this type of innovation (Stuart, Deckert et al.

1998; Whipple 2000). In comparison with intra-organizational research and development (R&D) projects, network-based initiatives allow lower (financial) risk and faster access to essential competencies.

Collaboration in small-step innovation (or continuous improvement) of products and processes on the other hand is considerably less common. Although apparently simpler, continuous innovation within a network of companies requires a much deeper integration between companies along the supply chain. The success of such profound integration projects is strongly dependent on issues such as open communication, knowledge sharing, trust and common goals (Stuart, Deckert et al. 1998; Tomkins 2001). Modern technology – especially internet technology- is able to support the extensive exchange of information needed for collaborative innovation. For this incremental type of innovation is the most common form of inter-company interaction customer-supplier collaboration. This form of collaboration consists of customer and supplier(s) working together, over a longer period of time, for the benefit of both (Ring and van de Ven 1992). Kogut (1988) argues that the primary motives for customer-supplier collaboration are enhancing market position, lowering transaction costs and learning from each other (Kogut 1988). Simatupang and Sridharan (2005) found that supply chain members who had higher levels of collaboration practices were able to achieve better operational performance and innovation activities. Similarly, Sahay (2003) argued that collaboration enables value creation in supply chain activities.

2.3 Drivers and obstacles of innovation in logistics

In today's knowledge-based economies, services hold an increasingly dynamic and crucial role. The logistics industry is an example of the erection and development of a vital new service-based industry. It has transformed from the business concept of transportation to that of serving the entire logistical needs of customers. Not only independent logistical firms but also most manufacturing firms need to be aware of the service aspects of the products they present their clients. The service component offers a very good change of gaining sustainable competitive advantage in the hyper-competitive global market. Conversely poor service or a reluctance to innovate offers a fairly good change of losing customers (Chapman, Soosay et al. 2002; Esper, Fugate et al. 2007).

A recent development in the area of continuous innovation and improvement is the concept of collaborative improvement. This research area concentrates on continuous innovation and continuous improvement over the classic boundaries of an organisation in the larger context of the supply chain (Boer, Gertsen et al. 2005). The same reasons that motivated companies to collaborate in their supply chain in the first place can also motivate companies to embark on collaborative improvement activities, i.e. better cost efficiency, improving buying power, shorter delivery times and shorter product development times (*idea to shelf time*).

Consumers play an especially important role in innovation in services. One of the specific attributes of services is that the consumer is highly involved in the 'production' process. Each consumer has its own special wishes and demands concerning the features of the provided service. And because of this consumers do not only "... provide input on their own needs, they can also help design the service concept and the delivery process" (Zeithaml and Bitner 2003). In some cases - e.g. the scientific instrument market- consumers can even take the lead in innovation processes whereas producers merely adopt an assisting and supporting role (von Hippel 1976).

Both the importance of innovation for gaining competitive advantages and the new and growing position of the logistics sector has been demonstrated from the existing literature. The combination of the two areas is a very interesting one. Even more interesting is the combination of the concept of innovation and the logistics supply chain. Especially because literature shows that consumers play an important and highly involved role in the innovation processes of service providing companies.

To our knowledge there are only a few studies that come close to this area of research. The first study of interest is Soosay and Hyland (2004) who distilled six main areas of key drivers from the Continuous Improvement in Global Product Innovation Management project (CIMA-ESPRIT 26056). They used these six main areas of key drivers to start their exploratory study into the drivers of innovation in logistics; a series of case studies in Australian and Singaporean distribution centres. In semi-structured interviews managers from each of the participating companies were asked to describe what factors were driving their company towards innovation. The research -characterized as a preliminary investigation- resulted in a list of seven drivers of innovation in distribution centres: (1) financial reasons; (2) customer orientation; (3) employee orientation; (4) to have a leading edge in industry; (5) operational performance; (6) competition; and (7) shareholder orientation.

Another study of importance is Chieh-Yu (2006), which reports results from a survey under

Taiwanese service companies to study factors influencing technological innovations in services (Chieh-Yu 2006). Chieh-Yu focussed purely on the technological side of innovation and approached the subject from a “macro” point of view. Chieh-Yu proved that there is a significant positive relationship between six defined factors and technological innovation: (1) explicitness of technology; (2) accumulation of technology; (3) organizational encouragement; (4) quality of human resources; (5) environmental uncertainty; and (6) governmental support.

Tourigny and Le (2004) focus mainly on a manufacturing environment and shows a particular interest in the relation between firm characteristics and perceived obstacles of innovation. Tourigny and Le (2004) reportS that over 90% of the investigated innovative firms faced some form of impediments. The five factors perceived as the most serious impediments to innovation are (1) inability to devote staff on an on-going basis due to production requirements; (2) high cost of development; (3) lack of skilled personnel; (4) lack of financing; and (5) organizational rigidities in the firm.

As is shown above, the research on both drivers and obstacles of innovation in logistics limited. Reports on research on drivers and obstacles of innovation in cooperation with suppliers and / or customers are even rarer. In order to make sustainable progress within these areas one of the first questions to be answered is what factors drive and what factors impede firms to start (or keep) innovating. This research aims to answer this question and by doing so creating a foundation for further research. The combined findings of the Soosay and Hyland (2006) and Chieh-Yu (2006) research on drivers of innovation and the Tourigny and Le (2004) study on obstacles of innovation form the theoretical starting point of this research. Table 1 summarises the factors that are brought forward in the literature as drivers of innovation.

Table 1 Drivers and obstacles of innovation

Influencing Factors	Explanation
1. Financial reasons	One of the most important group of drivers according to Soosay and Hyland (2004). High cost of development and lack of financing are important impediments of innovation according to Tourigny and Le (2004)
2. Organizational support and encouragement	Chieh-Yu (2006) proves that organizational encouragement has a positive influence on innovation. Tourigny and Le (2004) prove that lack of ongoing organizational support and encouragement has a negative influence on innovation
3. Employee orientation	The results of all three researches support that quality and knowledge of personnel and the quality of Human Resource Systems is influencing innovation in a both positive and negative way
4. Environmental uncertainty	Both uncertainty and competition are generally agreed on to be important drivers of innovation. Although competition is closely related to uncertainty is the contents of environmental much wider than just competition. Market development, customer behaviours and macro economic developments for example can be grouped under environmental uncertainties. The absence of uncertainty and competition can ease a companies' urge to innovate.
5. Competition	The most important driver of innovation according to Soosay and Hyland (2004).
6. Customer orientation	A surprisingly important driver of innovation according to Chieh-Yu (2006). The absence of this factor in other researches can be explained by the absence of a governmental stimulation programme. The absence of governmental support in various forms – i.e. financing and knowledge – can act as an obstacle for innovation.
7. Governmental support	Not only an important obstacle of innovation according to Tourigny and Le (2004) but also the most difficult impediment to overcome.
8. Organizational rigidities	Important group of drivers in Soosay and Hyland (2004). Supports the generally accepted idea that innovation is a very important way for companies to gain sustainable competitive advantage. Tourigny and Le (2004) and Gieskes and van der Heijden (2004) argue that too much of a <i>goal focus</i> can function as an obstacle by leaving no room for innovation
9. Operational performance	

3 Case study Methodology and Sample

For this research an exploratory approach was adopted as there is limited empirical research on drivers and obstacles of innovation in logistics. A series of case studies involving interviews and observations was used. The adoption of a case-study methodology can be justified not only by the limitations of existing reports on empirical research but also by the conclusions that innovation is a multi-perspective topic and that influencing factors of innovation do not operate separately but

interdependently. These arguments justify an in-depth qualitative approach instead of a wider and quantitative approach. The methodology combines both 'what' and 'how' questions to explore the selected research area with greater depth (Yin 1994). The basic aim of this study is not to create theory but to develop scientific knowledge (Reynolds 1971).

This study aims to achieve a sense of understanding what causes different events of improvement and innovation. Four research questions were formulated:

- What are the most important factors to cause logistics firms to (continuously) improve and innovate? (drivers of innovation)
- What are the most important factors hampering logistics firms to (continuously) improve and innovate? (obstacles of innovation)
- What are the most important factors to cause logistics firms to (continuously) improve and innovate in cooperation with suppliers and / or customers? (drivers of collaborative improvement)
- What are the most important factors hampering logistics firms to (continuously) improve and innovate in cooperation with suppliers and / or customers? (obstacles of collaborative improvement)

In order to collect the data to give in-depth – 'what', 'why' and 'how'- answers on these research questions a group of 30 logistical firms and firms with a distinct logistics function was identified using purposive or judgemental sampling. Purpose sampling is useful when a research aims to develop an area about which is only little known (Mays and Pope 1995). Guarte and Barrios (2006) prove that purposive sampling as used in this study can produce reliable results since bias is contained even in severely heterogeneous populations. To be able to create an image of the logistics sector as a whole the research population needed to contain; transportation companies (traditional and specialized), distribution centres, trading companies and manufacturing companies from different sizes and active on different markets. This led to a sample structure (the *first step* Voss et al. 2002) constructed along two scales; size and logistics function/ capabilities. Then through an internet scan of firm websites and in close cooperation with the participating consultancies a number of companies with the required characteristics was selected (the *second step* Voss et al. 2002). In total, 30 potential case companies were identified, of which 15 were initially contacted. Of these 15 companies, ten agreed to participate. In each of the selected companies managers directly involved in decision making processes on innovation, were interviewed.

The interviews had an average duration of 80 minutes with a minimum of 55 minutes and a maximum of 150 minutes. The majority of the interviewed managers were after the interview prepared to answer extra questions and provide additional information through telephone or by email during the course of the research. All of the 10 companies have been visited to observe the business processes. Some of these visits consisted of a sight seeing tour through all the companies' processes others involved short interviews with employees on all levels and detailed introductions to the different systems and processes. In addition to the managers of the logistics firms a group of 4 consultants in logistics have been interviewed. The consultants were interviewed in order to support the research findings with expert –firm external- opinions.

The interviews with both the managers of the logistics firms and the consultants were conducted at the hand of a semi-structured interview (appendix A). The interview structure consists of both descriptive questions (firm characteristics) and questions derived from the research questions that challenge the interviewees to share his knowledge and experience on the researched phenomenon. This method makes it possible to collect data rich in detail. All interviewees confirmed the contents of the interview notes and analyses derived from the interviews. The structure of the interviews and the confirmation of the data together, provide a reasonable degree of internal validity. Multiple cases may reduce the depth of study when resources are constrained but can both augment external validity, and help guard against observer bias (Voss et al. 2002). The external validity however, remains relatively low since that is one of the characteristics of a case-study approach and because of the fact that there were only 10 firms studied. The limitation of the research population to 10 firms was the result of a decision to ensure a research with greater depth.

The ten case firms represent an cross section of logistics functions and practices in the Netherlands. Not only traditional transportation and distribution companies were selected, but also the logistic departments/ functions of manufacturing, assembly and trading companies. The smallest firm in the study has a staff of 25 employees. The largest firm has a staff of somewhere around 25.000 employees. Table 2 shows an overview of the profiles of the participating companies and the consultancies forming the expert group.

Table 2 Profile of companies interviewed

Firm	Short description	Number of employees	Age in years	Independent or logistic function of a company
F1	Small family transportation company	25	40	Independent
F2	Medium size transportation company	90	73	Independent
F3	Medium size transportation company specialized in conditioned transports	140	10	Independent
F4	Large transportation and distribution company	1000	37	Independent
F5	Large trading company of metal pipes. Also service provider: transportation, warehousing, certification etc.	70	20	Function of larger company
F6	Large contract manufacturer of high tech, mega-tronic machinery. (main facility)	1700	50	Function of larger company
F7	Large contract manufacturer of high tech, mega-tronic machinery (independent local facility)	330	100	Function of larger company
F8	Large production company of household electrics	25.000	< 1	Function of larger company
F9	Large chain of supermarkets (distribution centre)	400	12	Function of larger company
F10	Large chain of retail stores (distribution centre)	100	34	Function of larger company
Consultancy	Short description			
C1	Consultancy specialized in offering clients total logistic solutions to improve the output of their operations.			
C2	Consultancy specialized in process improvement in every aspect of the clients' organisation			
C3	Consultancy specialized in process improvement in every aspect of the clients' organisation			
C4	Consultancy specialized in aiding innovation and cooperation			

4 Results and Discussion

Although a research population of ten firms and an expert group of four consultancies is too small to produce significant “truths”, it can be used to detect trends and develop hypotheses. The results of this research show great resemblance with the outcomes of the Soosay and Hyland study into drivers of innovation in logistics in Australia and Singapore. Soosay and Hyland (2004) used a research population of ten firms but focused on distribution centers only. In both Australia/Singapore and the Netherlands the managers interviewed ranked customer orientation, financial reasons and operational performance as most important drivers of innovation in logistics. Whereas the Australian and Singaporean firms considered competition to be one of the most important factors causing an organization to innovate, the Dutch companies seem to look at it differently. They consider customer orientation a driver category surpassing the competition category (see Table 3). When their companies are able to meet or exceed customer demands they will stay in competition or beat the competition. Focus on the customer not on the competitor, is their motto.

These outcomes are in line with the literature stating that organizations, in order to innovate, must evolve primarily from an inward orientation keeping in mind their resources, capabilities and competencies, towards an outward orientation where the firms devote attention to the needs of its clients and the aggressive and volatile market place (Roberts 1991; Shanklin and Ryans 1984). The results also support the theories of Dodgson (1993) and Shepherd and Ahmed (2000) who argue that an increasingly dynamic markets, heavy (worldwide) competition and increasingly sophisticated customer needs drive companies to embark on innovative activities.

The important role of customers within the (logistics) service providing sector in general and in innovation in particular, as argued by Zeithaml and Bitner (2003) and von Hippel (1976), is acknowledged by all of the participating interviewees. Not only are the customers the ones “paying the bills” they also have the knowledge and specifications of what “products” they want (today and tomorrow) and they are the owners of the most important operational performance score.

The category environmental uncertainty was not part of the Soosay and Hyland research. Gieskes and van der Heijden (2004), however, stated that the greater the uncertainties the greater the need is for learning and innovation. Three of the interviewed companies have ranked environmental

uncertainty within their top three of drivers of innovation but all of the participating companies confirm that environmental uncertainty functions as a driver of innovation. At this moment they perceive the high oil prizes, quickly changing legislation and the developments on the labour market as the environmental uncertainties with the most influence.

During the interviews a *long term vision* emerged as a tenth factor affecting innovation in both positive and negative way. Both the interviewed managers and the consultants confirmed the important effect of a long term view on innovation. The argumentation that a clear and well communicated long term view guides the activities of the organisation towards the same goals and that it broadens the scope of a company over the edge of today's business, are in line with Mintzbergs theories (1987; 1994). He argues that a long term view in the form of a strategy, makes all parts of a company, including its innovative capacity, aim and concentrate its attention and efforts on the same goals. The absence of a good strategy can result in a fragmented use of capacities. It remains possible to "do things right but it becomes more difficult to do the right things". De Geus (1988) and Senge (1990) as important represents of the organizational learning school, believe that a long term vision is essential for organizational learning and the development of all forms of capacities present within an organisation.

Table 3 Results from the interviews on single firm innovation

Issues	Driver	Firms	Obstacle	Firms	Consultants View	Consultants
Financial reasons	Confirmed. Nine out of ten firms find this one of the most important drivers for innovation. Rising oil prizes increases the influence of this driver.	F1, F2, F3, F4, F5, F7, F8, F9, F10	Confirmed. Especially small firms find financial obstacles for undertaking innovation. Large firms do not experience this as an obstacle, but recognise this factor as an impeding factor for small firms.	F1, F2, F3, F4, F5, F6, F9	Confirm that financial reasons are drivers and obstacles for innovation.	C1, C3, C4
Organizational support	The general opinion is that the top-management puts little effort in stimulating innovation and for that reasons has little importance as a driver of innovation.		All companies acknowledge the influence of organizational support on innovation. The absence or low level of organizational support is mostly explained by a “low sense of urgency”. A second explanation is the low level of knowledge and experience of innovation.	F2, F4, F10	Important driver but is mostly absent = important obstacle	C1, C2, C3, C4
Employee orientation	Considered to only have limited influence as a driver for innovation	F2	Considered to be an important obstacle for innovation by four of the firms. It is although remarkable that only one of these four has a system or tool to improve the innovative attitude and skills of its working force	F2, F4, F5, F8	Only a few large companies fully understand the important influence of employees on innovation.	C2, C3
Environmental uncertainty	Considered to be an important driver for innovation. Examples of influential uncertainties are; rising oil prizes, new and rapidly changing legislation and changing customer demands.	F1, F2, F3, F7, F9	Limited influence as an obstacle on innovation. Examples of desirable innovations cancelled due to possible staffing problems	F9, F10	Environmental uncertainties have too limited influence on innovation. The sector reacts too slow	C2, C3, C4
Competition	Considered to be a driver for innovation but regarded to be subordinate to the factor customer orientation.	F4, F10	All of the participating firms are experiencing heavy competition. This explains why the absence of competition is not mentioned as an obstacle for innovation		A sector with a brutal competition. Its influence on innovation cannot be denied.	C1, C2, C3, C4
Customer orientation	Together with financial reasons considered to be the most important driver for innovation.	F1, F3, F4, F5, F6, F7, F8, F9	-	-	All companies in this sector are aware of the importance of a customer orientation.	C1, C2, C3, C4
Governmental support	Not mentioned by one of the firms as an important driver for innovation but when asked generally considered to have a limited but positive influence on innovation.		-	-	Confirm the very limited but positive influence of governmental support. Support is offered in a very liberal way.	C1, C2, C3, C4
Organizational rigidities	-	-	All companies confirm organizational rigidities are functioning as an obstacle for innovation. Five of them consider organizational rigidities to be important obstacles. Examples are: Long lines of communication, centralized decision making (family businesses) and the “concrete layer”	F2, F4, F5, F7, F10	Confirm organizational rigidities as an obstacle for innovation.	C1, C2, C3, C4
Operational performance	The larger companies consider operational performance as an important driver of innovation.	F6, F8, F9	Too much “goal focus”, too lean organized, too focussed on the business of today; especially the small and medium sized companies experience operational performance as an important obstacle for innovation.	F1, F3, F7, F9	Especially in small and medium sized firm an important obstacle	C1, C2, C3, C4
Long term view	Because it converges all the activities in an organization on the same goals it is considered as an important driver. Consistent with existing literature on strategy.	F5, F8, F10	Only one firm named short term view as an important obstacle for innovation. This score is possibly explained by a natural unwillingness to admit that ones company is lacking a good long term view.	F6	Unanimous about the impeding effect of a short term view on innovation	C1, C2, C3, C4

Table 4 Results from the interviews on collaborative innovation

Issues	Driver	Firms	Obstacle	Firms	Consultants View	Consultants
Financial reasons	Confirmed. Nine out of ten firms find this one of the most important drivers for innovation. Rising oil prizes increases the influence of this driver.	F1, F4, F5, F7, F9, F10	Confirmed. Especially small firms find financial obstacles for undertaking innovation. Large firms do not experience this as an obstacle, but recognise this factor as an impeding factor for small firms.	F1, F2, F4, F9	Confirm that financial reasons are drivers and obstacles for innovation.	C1, C3, C4
Organizational support			When asked most companies acknowledge the influence of organizational support on collaborative innovation. The absence or low level of organizational support is mostly explained by a “low sense of urgency”. A second explanation is the low level of knowledge and experience of innovation.	F2, F10	Confirm that low sense of urgency and a low level of knowledge and experience impede organizational support	C1, C2, C3, C4
Employee orientation	-	-	-	-	-	-
Environmental uncertainty	-	-	-	-	Environmental uncertainties have too limited influence on innovation. The sector reacts too slow	C2, C3, C4
Competition	-	-	-	-	Small scale projects show that collaborative innovation can strongly improve the competitiveness of companies	C4
Customer orientation	Considered as the most important factor driving innovation in collaborative improvement. Perceived advantages: closer relationships, higher change over barriers, better response to customer demand etc.	F1, F2, F3, F4, F5, F6, F10	-	-	All companies in this sector are aware of the importance of a customer orientation.	C1, C2, C3, C4
Governmental support	-	-	-	-	Although the government is stimulating these forms of innovation the successes are still on a very small scale.	C4
Organizational rigidities	-	-	Traditional forms of communication with clients / suppliers through sales / purchase obstruct collaborative innovation which strives to very different goals.	F10	(Too little experience in this matter)	
Operational performance	Considered to offer good chances too improve the supply chain. For larger and more mature companies at some point a logical next step to take in order to improve the supply chain.	F2, F3, F6, F7, F8, F9	Small companies indicate that the focus is on the improvement of internal processes. The larger companies support from their experience that small companies have great difficulty to turn their focus away from just the internal processes.	F1, F4	Especially in small and medium sized firms an important obstacle	C1, C2, C3, C4
Long term view	Because it converges all the activities in an organization on the same goals it is considered as an important driver. Consistent with existing literature on strategy.	F8, F10	-	-	Unanimous about the impeding effect of a short term view on innovation	C1, C2, C3, C4
Independence	-	-	Together with other “soft issues” as trust and communication is the feeling of losing independence considered to be an important factor obstructing innovation. This is in line with existing literature on co operations and supply chain.	F2, F3, F10	Especially small and medium sized, family owned companies experience these factors as obstructive for innovation.	C2, C3, C4

The results create the image of a sector / function that has traditionally been in a following and supporting role. On the other hand are there all different kinds of indications that logistics are evolving from offering *transportation* to offering *solutions*. Several of the participating companies realize that innovation in logistics can be a way to gain competitive advantages for today and tomorrow. And several of the participating companies are taking the first basic steps on the “innovation and improvement path”. This image is consistent with conclusions of Chapman et al, after their extensive review of the existing literature; after a long period of being the closing factor within each organisation, logistics are being discovered as a strategic factor which provide a unique competitive advantage (Chapman, Soosay et al. 2002). On the other hand is the transition from *follower* to *enabler* far from ready noticing the results in the category organizational support and encouragement. A low sense of urgency and a lack of relevant knowledge seem to keep (top-) managers from putting innovation and improvement in logistics on their most wanted list.

The participating managers of the Dutch logistics firms have a different opinion toward governmental support and encouragement than their Taiwanese colleagues. Where Chieh-Yu (2006) shows governmental support as one of the most important factors causing companies to innovate are the result of this research indicating that governmental support has very little influence innovation. This difference in opinion can be explained by the approach of the Dutch government, which is rather liberal whereas the Taiwanese government can be characterized as dictating.

Soosay and Hyland (2004) and Tourigny and Le (2004) classified financial reason as both an important driver of innovation and an important obstacle for innovation. The findings of this research support these findings. The results also indicate that financial reasons have a stronger negative effect on innovation in smaller companies than in larger companies. Not only is it harder for smaller companies to free enough working capital to fund innovative activities but also is their relative risk higher. This argument is supported by Nooteboom (1991) who argues that smaller firms participate less in R&D because expected returns increase with size, while the risk of failure is independent of size, or decreases with increasing firm size, so that relative to expected returns risk is higher for smaller firms. Gieskes and van der Heijden (2004) argued that an extreme *goal focus* can create an environment which leaves no room for learning and innovation. This way a too strong goal alignment can function as an obstacle for innovation. The results of this research concur with these arguments. The participating managers and consultants consider a too strong focus on achieving the goals of the every day business, as an important factor hampering innovation. It is interesting to see that these situations of too much goal focus are created by other (familiar) factors; little financial space, too “lean” organised, low sense of urgency causes by a lack of relevant knowledge etc.

It is not surprising that the answers on the question on collaborative innovation tend to focus around the same categories as the answers on the questions on “single firm” innovation and improvement (see Table 4). Even more than “single firm” innovation, collaborative innovation is obstructed by a clear lack of knowledge and experience. And just like the literature suggested is the influence of “soft” issues like open communication, willingness to share knowledge, trust and common goals of great importance (Stuart, Deckert et al. 1998; Tomkins 2001). The hesitation to share “business secrets”, the unwillingness to share the revenues and the feeling to lose independence are examples of these “soft” issues present amongst the participants of this study.

During the interviews another factor of importance was added to the category *customer orientation*; the creation of change over barriers. The managers believe that the more intimate the relationship with their customers is the smaller the chance is that customers will turn to another party. And even when problems or dissatisfactions come to the surface customers will be more inclined to communicate these issues in order to keep the cooperation intact than to choose a direct switch of suppliers. The positive connection between cooperation and customer loyalty in a business to business environment has also been shown by the study of Lawson-Body and O’Keefe (2006).

5 Conclusions and Directions for Future Research

The theoretical implications of the underlying study are threefold. It addresses the three important limitation areas of existing literature as described in the introduction; obstacles of innovation, innovation in logistics and collaborative innovation. Obstacles of innovation have been the object of study before but these researches focused on manufacturing companies (Tourigny and Le 2004; Koc and Ceylan 2007). Although the responses of the interviewees showed similarities with the obstacles as described in existing literature- i.e. financial costs and risk and organizational rigidities- there were also distinct

differences. The most notable difference is the category organizational support and encouragement. The factors low sense of urgency and lack of relevant knowledge and experience also seem to have an important impeding effect on innovation and improvement in logistics. Especially the smaller companies seem to suffer from a lack of knowledge.

The second limitation of existing literature on innovation is the limited research dedicated to innovation in logistics. To gain a better insight in the drivers and obstacles of innovation through the whole logistics spectrum this research broadened the scope from solely distribution centres and included the logistics functions of production, manufacturing and trading companies. The interviews show that in companies where logistics are not the core business the perceived importance of logistics is lower. The perceived importance of logistics also seems to be different. For example the logistics focus of the participating manufacturing companies is on deliverance reliability in contrast to the participating trading companies with a strong logistic focus on cost minimization.

The third limitation stated that whereas most literature focuses on single firm innovation, this research aimed to explore the area of collaborative improvement. One of the most interesting findings of this study is that the participating managers seem to be completely unfamiliar with the ideas of collaborative improvement. Their answers come from a short contemplation on the subject rather than from knowledge and experience. It is not surprising that the managers think that the same factors that impede innovation within their firm will also impede innovation in collaboration with other firms. It is surprising that all of the interviewed managers state that from their point of view there are advantages to be gained from collaborative improvement activities. The supply chain manager of the largest participating company is convinced that modern companies reach a point in their maturity that embarking on collaborative innovation is the next logical step a company should take; the performed analyses simply show what the possible revenues of such activities can be. The companies that are or have been involved in collaborative improvement activities, claim that the results of these co-operations were very successful; the development of new, customized services, an increase of efficiency and the acquisition of essential knowledge.

The responses from both the managers and the consultancies create the image of logistics as a following and non-innovative sector. This situation seems to be caused by the combination of a lack of possibilities (no financial space, no free capacity, no time and no knowledge) and a lack of willingness (no sense of urgency). On the other hand is innovation regarded by all of the participants as a stepping stone for business success. The results also show a clear trend that the perceived importance of logistics, and thus the managerial attention for logistic, is increasing. The most important managerial implication of this study is that it enlarges the insight in innovation in logistics. A better understanding of what drives and hampers innovation will offer good opportunities to improve innovation management, giving organizations the change to gain sustainable competitive advantages.

Koc and Ceylan (2007) found that the obstacles and drivers of innovation function interdependent; Combinations of drivers influence innovation, combinations of obstacles influence innovation and combinations of drivers and obstacles influence innovation. The results of this study are in line with these findings. Little knowledge of innovation can result in a low sense of urgency to start innovation. A low sense of urgency in combination with little financial space, a shortage in capacity and the pressure of achieving the goals of the every day business can stop every innovation initiative from surfacing. The same way will not having a long term view have an impeding effect on the development of an innovative attitude amongst the working force which again can function as an obstacle for innovation.

Although the adoption of a case-study methodology is the correct way to approach a complex and rather unexplored terrain it also limits the external validity of the results and conclusions. The study presents a useful starting point but additional research is necessary to validate and extend the research results. Additional research can determine if there truly is a lack of knowledge of innovation and improvement within logistics firms and whether the logistics sector truly is an innovation following sector. And if so, what factors are causing this situation? Is it temporary or structural? Are there good options to improve the level of knowledge? It is also interesting to compare the knowledge level within the logistics sector with the knowledge level within known innovative branches/ sectors.

This research has shown clear indications that logistics are approached differently within different branches/sectors. It takes further research to be able to determine, categorize and classify the different attitudes towards logistics of different logistics branches/ sectors. This more detailed insight will give researchers and managers the possibility to firm their grip on innovation in logistics.

Another interesting study could be aimed at the effects of implemented collaborative innovation strategies and answer cost and benefits questions as they have appeared throughout this research. This

research can possibly have important managerial implications when it is able to show what type of organization under what circumstances can benefit from collaborative innovation strategies.

Great parts of the logistics sector still have the chance to develop from traditional transportation and distribution companies / functions to strategic enablers, able to give customers (internal and external) sustainable competitive advantages. Continuous innovation and improvement are part of the way towards this goal. This research shows that the opportunities of innovation and improvement are often acknowledged but less often taken. The “rumour of success” is still fighting the obstacles of innovation.

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Appendix A: Interview protocol

Name company / organisation:

Date interview:

Firm characteristics:

- Short description of function and capabilities
- Size (number of employees)
- Independent firm or logistic function of a larger company
- Age
- Used technology (high / medium / low)
- Innovative or non-innovative firm;
 - Innovation project in last 3 yrs:
 - R&D function :
 - Quality cycles :
 - Knowledge management (systems):

What factors are driving organisations in your branch / market to innovation?

And What factors have caused your organisation to continuously innovate in the past few years?

Or What factors have caused your organisation to put innovation on the agenda?

Or What factors could drive your organisation towards continuous innovation?

And

Please explain your answers. (Backgrounds and sources of the mentioned factors (push-pull en external-internal))

And Please rank the mentioned drivers of innovation in most important, second important and third important.

And Please explain your answers.

What factors in your branch/ market are impeding innovation? (obstacles of innovation)

And What factors impeding innovation did your company meet in the last few years?

And (Please answer for every one of the mentioned obstacles)

Did this obstacle cause:

- That the innovation project / process could not be started?
- That the innovation project / process could not be finished?
- That the innovation project / process was delayed / damaged?

And Please explain your answers. (Backgrounds and sources of the mentioned factors (push-pull en external-internal))

And Please rank the mentioned obstacles of innovation in most important, second important and third important.

And Please explain your answers.

Have there been innovation projects/ activities in cooperation with customers and/or suppliers in the last three years?

And (when the answer is negative) Do you know of any company in your branch / market that started and innovation project / activity in cooperation with customers and/or suppliers in the last three years?

And What factors are driving your company / branch to innovation in cooperation with customers and/or suppliers?

And Please explain your answers.

And Please rank the mentioned drivers of innovation in most important, second important and third important.

And Please explain your answers.

Additional questions on the cooperation / (strategic) alliance:

Is there also cooperation in other areas:

- Joint investments?
- Information exchange?
- Etc

What party initiated the cooperation?

Was it a voluntary or coerced cooperation?

What factors are impeding your company / branch to innovate in cooperation with customers and/or suppliers? (obstacles of cooperative innovation)

And Please explain your answers. (Backgrounds and sources of the mentioned factors (push-pull en external-internal))

And Please rank the mentioned obstacles of innovation in most important, second important and third important.
