International Food and Agribusiness Management Review
Volume 15, Special Issue B, 2012

Dutch Logistics Service Providers and Sustainable Physical Distribution: Searching for Focus

Reinder Pieters[Ⓟa], Hans-Heinrich Glöckner[b], Onno Omta[c], and Stef Weijers[d]

[a] *Lecturer,* [b] *Professor,* [d] *Professor, Business Studies, University of Arnhem and Nijmegen, P.O. Box 5171, Arnhem, Gelderland, 6802ED, The Netherlands*

[c] *Professor, Department of Business Administration, Wageningen University, Hollandseweg 1, Wageningen, 6706KN, The Netherlands*

Abstract

As environmental concerns becoming increasingly important to logistics service providers, the question arises as to how they can achieve sustainable physical distribution practices while surviving the severe competition in freight transport. This issue is further complicated by the pressures from the many different shippers involved, public expectations and regulating authorities. Therefore, achieving sustainable physical distribution is definitely a wicked problem. In order to understand how logistics service providers attempt to tackle these problems, a research study was conducted amongst logistics service providers who are frontrunners in implementing sustainability practices and who participate in the *Lean and Green* program, to promote sustainability within the logistic chain in the Netherlands. Companies willing to participate in this award scheme, must achieve the goal of reducing their CO_2 production by 20% within a 5-year-period. The transport market is very competitive and sustainability is just one of the many logistical concerns that service providers must solve. Our research shows that the logistics service providers participating in the Lean and Green scheme preferred solutions which involved cooperative strategies over – third-parties solutions.

Keywords: sustainable distribution systems, logistics service providers, wicked problems

Ⓟ Corresponding Author: Tel: + 31 649 891 595
Email: R. Pieters: reinder.pieters@han.nl
H-H. Glöckner: hansheinrich.gloeckner@han.nl
S.W.F. Omta: onno.omta@wur.nl
S.Weijers: stef.weijers@han.nl

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved

Introduction

Environmental issues have captured the attention of stakeholders, with governments, companies and institutions now leading initiatives which incorporate sustainability into their operating strategies (De Ron 2001; McDonough and Braungart 2002). It is not surprising, that sustainability is also featured on the agendas of logistics service providers (Ploos van Amstel 2008). But how are they attempting to make their supply chain more sustainable? Can lessons be learned from those logistics service providers who are the best in their class? And what is the role played by the shippers?

The Dutch logistics sector has been a leader in Europe integrating sustainable business practices across the logistics sector and currently ranks fourth in the World Logistics Performance Index (World Bank 2011). Previously, the Netherlands held the number two slot after Singapore, but was surpassed by Germany and Sweden in 2010. The Dutch government would like the Netherlands to lead Europe by 2020, but this should be accomplished only through the development of sustainable logistics. Sustainability is thus a reference point for all the recommendations and implementation (Topteam Logistiek 2011).

The logistics sector is important to the Dutch economy, contributing € 40 billion (8.5%) to the Dutch GDP and an estimated 750,000 jobs (10%) in 2010. With the EU demanding freight transport to be cleaner (European Commission 2004; European Commission 2011), it is expected that sustainability will become one of the prime drivers within the supply chain (Van den Broek and Van den Broek-Serlé 2010). But just how to achieve a sustainable supply chain and what it implies is not standardized. In 2008, transportation was responsible for 21% of all CO_2 production within the Netherlands—road transport (private and freight) comprises the largest portion at 7%. The remainder is divided into inland shipping (5%), rail (0.3%), air transportation (1.8%) and sea transport (14%). Within road transport, freight transport comprises 36% (Van der Meulen and Kindt 2010). These figures show that the Dutch freight transport sector produced a considerable amount of CO_2 (6%) in the Netherlands in 2008. In the near future, the Dutch logistics service providers and shippers will need to control or, even lower the amounts of CO_2 produced (European Commission 2004; European Commission 2011; Topteam Logistiek 2011). But is there a guaranteed and unique way to reduce CO_2 omissions which will please all stakeholders?

This paper investigates how Dutch logistics service providers try to make one aspect of the supply chain—physical distribution (Ploos van Amstel 2008) sustainable. Where do Dutch logistics service providers look for solutions when placed between government intentions, customer's demands and their own ethical behaviour? With so many stakeholders who often have conflicting interests and demands, every situation is essentially unique. Is a common tactic possible or does every logistics service provider need to develop his own solution? In this study we want to understand what type of strategies Dutch logistics service providers have used to reduce CO_2.

The main question we want to answer is:

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

How do Dutch logistics service providers translate strategic policies into tangible sustainable activities which will impact physical distribution?

In order to answer this primary question we should answer the following sub-questions:

1. Which stakeholders are involved with the Dutch logistics service providers' decision-making processes thus making physical distribution sustainable?

2. What types of procedures have they developed to make physical distribution more sustainable?

The conceptual framework for our research is based on the same heuristic model used in the 1994 NEA/Cranfield study. Weijers, Kuipers and Becker (2002) adapted this framework for research in industry driven innovations for logistics service providers. We have adapted their model to trace the elements in sustainable physical distribution trends.

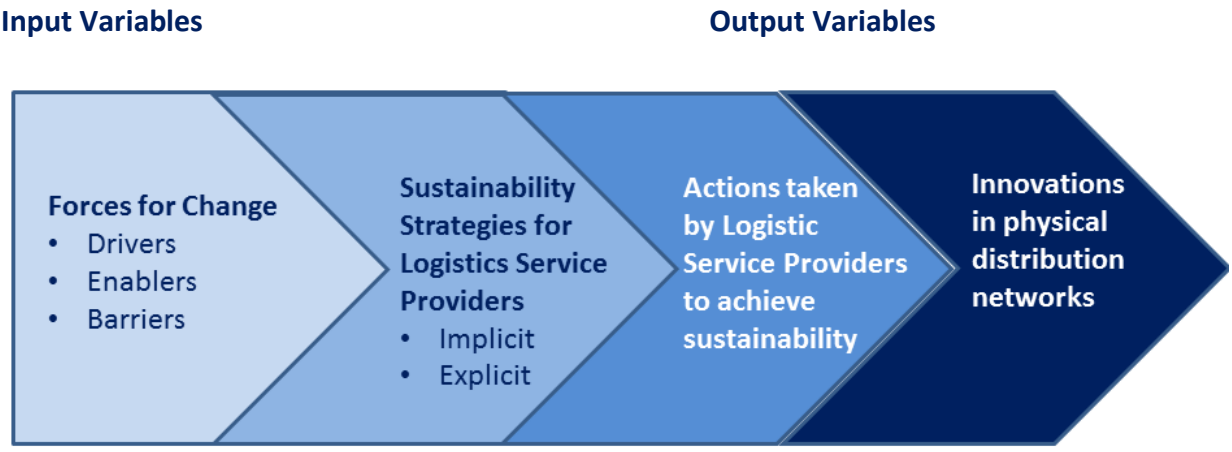

Figure 1. Conceptual Framework

In our conceptual framework we assume that every logistics service provider operates within his own specific environment (financial situation, market, customers and location) and has his own special mix of forces for change (drivers, enablers and barriers). Combining these elements, the logistics service provider could develop a plan for achieving a higher level of sustainability. This strategy could be written down explicitly or implicitly embedded into the company's mission. Based on this strategy the logistics service provider implements the plan or maintains the status quo.

Using this conceptual framework we want to understand if new types of physical distribution networks have been developed due to a change in the company's strategy for sustainability. This change in strategy may (or may not) be influenced by the forces for change as explained above. We expect these new types of physical distribution networks will result in new demands on physical distribution systems and, this will drive innovations in sustainable physical distribution.

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

Based on this conceptual model our argument proceeds as follows: First, we review the forces for change literature, laying out the various aspects for the Dutch logistics service-provider sector. We then present our defense of the concept for "sustainable" physical distribution. Next we introduce sustainable practices which are being utilized by logistics service providers in the Netherlands. This section is based on a web survey conducted in 2010 amongst 82 logistics services providers who are connected to HAN University through work placements schemes, etc. We asked them to answer questions about their experience with sustainability. Sixty-one participants accepted this invitation and, of these, 41 completed the survey. The non-respondents gave work pressure and lack of time as reasons for not completing the questionnaire. As a convenient sample, this group provided a good cross section of small, medium and large logistics service providers and allowed us to get a strong impression of our target group's views.

Finally, we considered the actions taken by logistics service providers in order to make physical distribution more sustainable. In order to choose suitable providers, we opted to first observe how sustainable practices are being executed through Dutch logistics service providers before examining the innovators and leaders in this field. In order to understand the role of sustainability, we focused on the fifty largest logistics service providers operating in the Netherlands in 2012. By size, these were considered to dominate the Dutch market (Dijkhuizen 2012). The ranking of logistics service providers in the top 50 was determined by the number of full time employees working in the Netherlands. For 2012, the range was between 4.330 for number one, and 385 employees for number 50.

The second group consists of innovators who have taken the lead in sustainable entrepreneurship. This group consists of 145 logistics service providers who are participating in the award scheme Lean and Green (website Connekt). Twenty-five of the Lean and Green members are in the top 50 logistics service providers. Together, these two groups should give a reliable view of Dutch logistics service providers who are actively tackling sustainability.

Our research will concentrate on the sustainability aspects of the actual transport itself. Actions taken to improve sustainability, but not related to the actual transport—such as more environmentally friendly ways of cleaning cars etc., were not included.

It must be noted that the results presented here are based on what members of Lean and Green say they are doing, or going to do, in order to reach the required level of CO_2 reduction. What they are actually doing, or really have done and the impact of these actions will be the subject for further research.

Stakeholders for Sustainability

In this section we want to understand the various drivers and the forces of change which make physical distribution sustainable. First, we will examine the specific situation of the Dutch logistics service industry and the Dutch government's role in this context. Then we will investigate the impact of the shippers as one of the main driving forces for change in this very competitive market.

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

Our research focuses on Dutch logistics service providers and how they adapt to the new demands of implementing sustainable practices within the physical distribution sector. But does this group differ from their counterparts elsewhere in Europe or even the World? Although Dutch logistics service providers work in a market dominated by heavy competition and low profit margins, the difference can be found in the way the Dutch work together. In the Netherlands a culture exists of consultation and consensus building which is often called the poldermodel (Vollenbroek 2002); this is a stakeholders approach (Mitchel et al. 1997).

In the progression of finding a consensus, the Dutch government provides guidance and incentives. The award scheme Lean and Green discussed below is such an instrument setup by the Dutch government to speed up the process and structure discussions.

This type of consensus building is time consuming. In the Netherlands, local governments such as the cities of Utrecht (2007), Amsterdam (2008) and The Hague (2010), have installed "milieuzones (green zones)" which restrict access for certain large trucks. Each city applies different rules and regulations; for example, fixed timeframes for delivery. If the transport industry fails to formulate a common approach soon, more and more cities will turn areas into green zones—causing more confusion for all concerned. But the Netherlands is not an island unto itself; other countries, such as Germany, link the toll for the motorways to the greenness of the truck. With Germany being a main trading partner, this certainly affects the Dutch transport sector. Perhaps the Dutch logistics service sector should look to its main economic partner and neighbour for guidance and direction? Or even better, why not let the European Union regulate sustainability for physical distribution?

The shipper as a customer of the logistics service provider plays an important role. The transport market is best described as being dominated by heavy competition and low profit margins, so the customer is certainly king (Christopher 2005). But how important is sustainability for these customers of logistics service providers? A survey amongst shippers conducted by Van der Meulen and Kindt (2010) found that shippers used certain criteria when selecting a logistics service provider. The criteria included: reliability, price, service, sustainability and innovation. When asked to rank these criteria, the results favored price and reliability, with sustainability near the bottom, in fourth place.

Table 1. Main selection criteria according to shippers

Selection Criteria	Weight Price =100
Price	100
Reliability	94
Service	72
Sustainability	45
Innovation	33

These findings are further supported by literature regarding logistical considerations; choices made in regards to transportation, are usually determined by two things (Christopher 2005; Visser 2010):

1. effectiveness i.e. speed and reliability
2. efficiency (low cost)

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

The web survey gives a similar impression. Thirty-two (78%) of the respondents say cost is the most important issue for transportation and 34 (83%) do not think that the customer is willing to pay for sustainability.

Simply put, the customer requires "more value for less money" (Van Dorp et al. 1992, 23). The question is whether in the current era, is this still valid? There is a trend amongst customers to demand a higher level of socially responsible behavior from the supply chain partners (Maloni and Brown 2006).

The portfolio model of Kraljic (1983) can be used to better understand the shipper's choice. Kraljic determines each item purchased by four criteria:

Table 2. Purchasing transport service and the portfolio model of Kraljic

Kraljic's Label	Main Selection Criteria	Decision
1. Leverage Items	Price	The product or service purchased determines the final price of the end product substantially. The purchaser will opt for the lowest cost.
2. Strategic Items	Quality	One specific aspect needs absolutely to be fulfilled by the item or service purchased.
3. Bottleneck Items	Availability	This product or service will not (always) be available. The purchaser will have to acquire potential sources for this product or service.
4. Non Critical Items	Nothing specific	As nothing specific determines this purchase, the purchaser's decision is not clearly cut.

Transportation costs comprise 10% to 25% of the overall costs for a product (Van Goor and Ploos van Amstel 2009). The higher the percentage, the more transportation becomes a leverage item—with price as the primary determining factor. Reliability is a quality aspect and makes transport a strategic purchase item. Transportation is rarely seen as a bottleneck item, except when transportation requires vehicles with unique specifications, due to the size or weight of the transported item, so this aspect can be ignored. Nothing specific can be said about the shippers who were classified in categories different from the top three identified above.

Sustainability could make transportation more expensive (purchases related to more efficient engines, new software purchases, etc.) or lengthen the delivery time (alternative modes for road transportation can take longer). Both of these conflict with the two primary characteristics for transportation as seen by the shipper (Christopher 2005).

On the basis of this information we can say that sustainability is important to the shipper, but costs and reliability take precedence.

Further investigation is needed into the relationship between what is said and what is done. The relationship between a logistics service provider and the shipper should be reflected in the

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

contract drawn up to facilitate and clarify future transport orders between these two partners. Such contracts or better service level agreements would have to inform all parties concerned as to what is expected and how it will be provided. In order to control performance, key performance indicators (KPI) need to be defined, as well as procedures for the calculation and evaluation of these KPIs (Bask 2001). A typical service level agreement would take the form of a call-off contract, within a framework for future individual transport orders. Every individual order should have to fit into the agreed call-off contract. Call-off contracts must reflect an appreciation for all concerned parties for a specific KPI, such as: price, reliability and sustainability, etc. If the call-off contracts represent the values of the companies involved, sustainability could be considered a top attribute, which also determines the choice of a particular logistics service provider.

An additional problem could be that even if those call-off contracts were drawn up at a high managerial level the individual order for a specific transport requirement would be placed by an employee at an operational level as shown below in Figure 2.

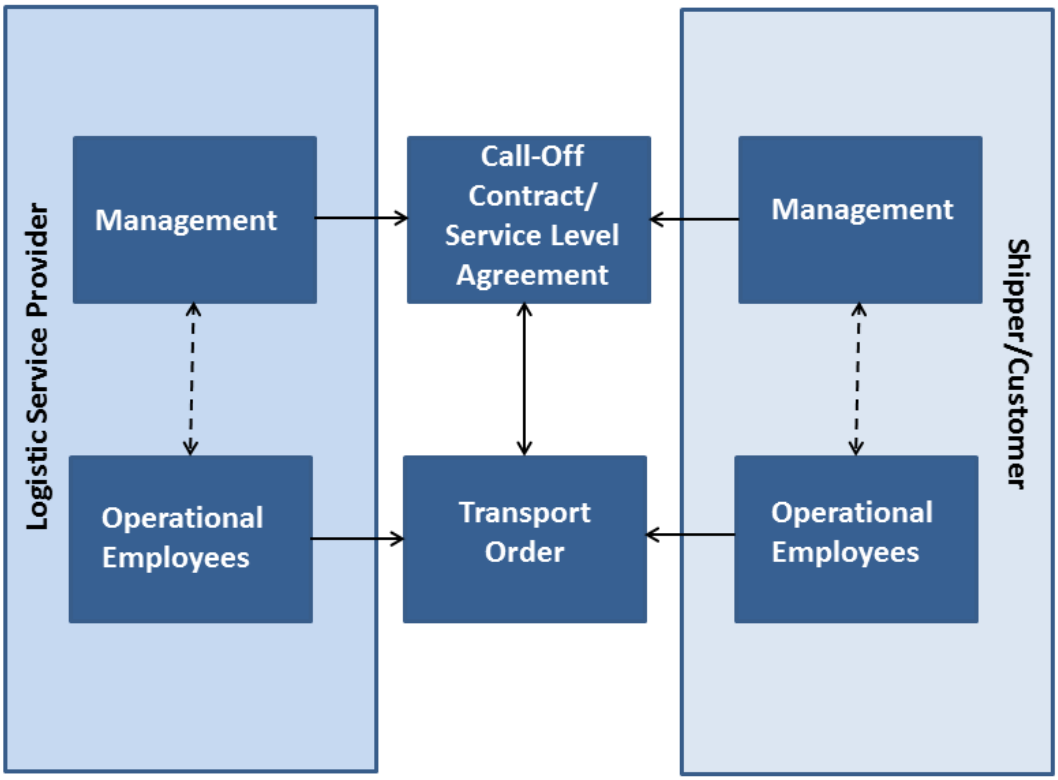

Figure 2. Interaction between the participants, the contract and the transport order

Theoretically all involved with physical distribution should be inspired by the same call-off contract, but what if the operational employees on one or both sides are driven (or measured) by aspects more in line with the findings in Table 1? A problem could result from within physical distribution because the KPIs of service level agreements are often not monitored (De Haan et al. 2011).

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

If we observe:

- national and local governments impose different restrictions on unsustainable transportation;
- shippers want to get it all: low prices and high service (Christopher 2005);
- shippers place sustainability below price and service (Van der Meulen and Kindt 2010)
- customers demand a higher level of socially responsible behavior from the supply chain partners (Maloni and Brown 2006)
- every shipper chooses a logistics service provider for different reasons (Kraljic 1983).

We can then conclude that not only do we find a huge array of stakeholders involved in physical distribution, they also place different demands on the logistics service provider. Sustainability is not ranked first, rather the main focus is on price and reliability. However, we see a trend that suggests customers expect value chain partners to behave in a socially responsible way and this includes sustainability.

If we further consider that:

- stakeholders themselves are on different levels, therefore, differing views of sustainable transport could exist;
- a logistics service provider has many different shippers for customers.

The problems become even more complicated. This must be a true Gordian knot which would take an Alexander to untie.[1] Can a unique solution be found which satisfies each and every stakeholder? In this case, we must conclude that sustainability is surely a wicked problem (Rittel and Webber 2012; Levin et al. 2012).

Sustainability and Physical Distribution

Every supply chain has its own specific needs and transport operations. We have opted to focus our research on the food sector and its primary determinants, hygiene and traceability.

Recent food scares in the EU with cucumbers and bean sprouts in 2011 underscored the need to ensure proper sanitation occurs within every link in the food supply chain. Hardly any chain evokes a more passionate-emotional response from the public than the food supply chain. This implies that 1) quality is definitely an important factor in the food supply chain (Kraljic 1983) when choosing a particular form of physical distribution; and, 2) it is under constant public scrutiny by consumers. Another reason we chose this particular supply chain is that it contains companies who are on the forefront of implementing sustainable practices in the Netherlands.

Physical distribution is the movement of goods from one location to another. It is more specific than transportation since the latter also includes internal transportation which takes place within the same location. This internal transportation is partly material management and not physical distribution (Van Goor and Ploos van Amstel 2009). A distribution network could include the incoming side of many suppliers (1 to N), but also suppliers belonging to their own company

[1] Refers to a Greek legend which remained unsolvable until Alexander the Great put forth an unconventional solution.

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

(internal suppliers 1 to N). On the outgoing side the same situation occurs. Here we could find a potentially large number (1 to N) of customers, or internal customers (1 to N) who belong to the same company as the sender (Ballou 2004).

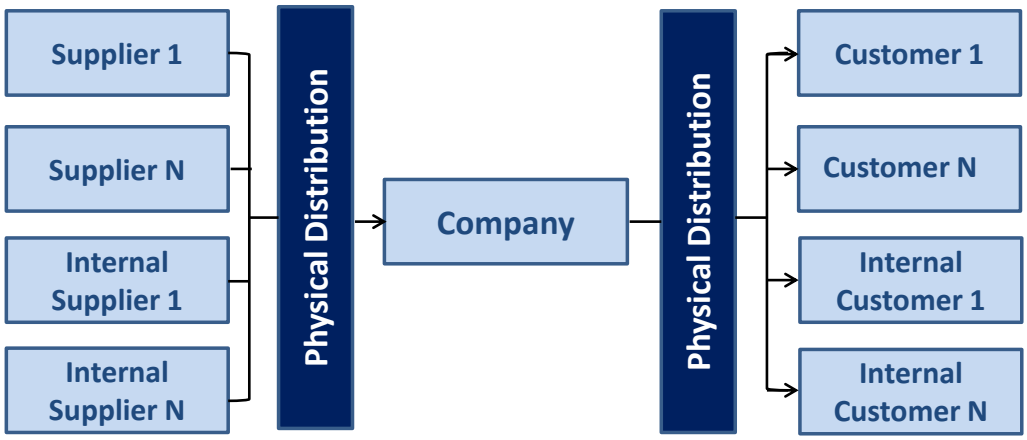

Figure 3. Physical distribution network for a company

What makes freight transportation services sustainable is not altogether clear, therefore it follows that what makes a logistics service provider more sustainable is not clear cut. This could be due to a lack of a generally accepted definition of sustainable transportation (Pezzey 1997). The definition provided by the Brundtland Commission (World Commission on Environment and Development 1987) is often used as a standard definition (Jeon and Amekudzi 2005), but this is difficult to translate into hard, measurable facts. As most trucks still employ an implosion engine, it can be stated that every litre of gasoline used for transportation today will not be available for future generations. The Brundtland based definitions therefore fail to be realistic and usable. A definition of Environmentally Sustainable Transportation (EST) as developed by the OECD is more precise and will serve as the basis for our research:

> *Transportation that does not endanger public health or ecosystems and meets the needs for access consistent with (a) use of renewable resources at below their rates of regeneration, and (b) use of non-renewable resources at below the rates of development of renewable substitutes (OECD 1999).*

This definition takes three aspects of EST into account: public health, ecosystems and natural resources. As a framework for environmental indicators, the Pressure-State-Response (PSR) model was developed by the OECD (1993). PSR provides a mechanism to monitor the status of the environment. The PSR cycle also provides a framework for investigation and analysis of processes involved in environmental degradation. In addition to application at national, regional, local and other sub-national levels, it can also be used for a sectoral analysis, and adapted to individual projects.

The idea behind the PSR model is that human activities exert pressures on the environment that affect its quality and the quantity of natural resources (state). Society then responds to these changes through environmental, general economic and sectoral policies, and through changes in

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

awareness and behavior or activities (societal response). The PSR model takes the pressures and the driving forces behind these activities into consideration and not the symptoms resulting from a changed state itself.

When discussing sustainable transportation, the attention focuses on reducing exhaust gases. The main exhaust gases are carbon dioxide (CO_2), sulphur dioxide (SO_2), nitrogen oxides (NO_x) and particulate matter (PM) (Francke et al. 2009). There are more polluting exhaust gases concerning transportation like carbon monoxide (CO) and hydrocarbons (HC) (Van der Meulen and Kindt 2010), but these two gases were never mentioned on the researched websites or by the survey respondents. In short, almost the literature on sustainable freight transportation, (Dutch) government information available on this subject, and from the researched target groups, concentrates on CO_2 reduction. The other gases are hardly mentioned. As for the transport sector itself, just two logistics service providers mentioned the four main gases, but do not show how they are trying to reduce them. Our research has followed this lead and also concentrates on the reduction of CO_2.

Award Programs for Sustainable Physical Distribution

What kinds of actions are taken by logistics service providers to achieve their sustainability goals? Hardly any specific information can be derived from the top 50 logistics service providers on how they want to achieve their goals for sustainability. What can be found are the networks or award programs with which they cooperate. Many awards programs have been set up to encourage and support sustainability within the transport sector. They offer participants an opportunity to be compared by a standard measure and to their competitors. For customers and interested stakeholders an award scheme creates trust in the logistics service providers' performance in the field of sustainability. Looking at the forces for change (drivers-enablers-barriers) in our conceptual model, we consider award schemes to be enablers. They allow participants to organize sustainability in a structured, controlled fashion. The web survey found that 22 (54%) of the respondents believe award schemes form an essential part of the shipper's appreciation for the logistics service providers' level of sustainability—an indication as to why an award scheme like Lean and Green is growing so fast.

Many award schemes for sustainable physical distribution have been setup. For the transport sector, the website for the Environmental Forum[2] registers 61 award schemes for the UK alone. For the Netherlands such a list has never been made. Many logistics service providers in the Dutch top 50 have joined international environmental award schemes e.g.: Dow Jones Sustainability World and Europe Index (8%), World Business Council for Sustainable Development (14%) or the United Nations Global Compact (24%). Other schemes mentioned include: FTSE4 Good Global Index (2%), FLEXpledge (2%), Carbon Trust Standard (2%), Green Supply Chain Award (2%), Electronic Industry Citizenship Coalition (2%), and Responsible Care® (2%). Some awards are linked to specific industries. For example, the goal of Responsible Care® is to seek continuous improvement in health, safety and environment of the chemical industry's stakeholders (website ICCA[3]). Five companies (10%) have joined more than one international environmental award scheme. Taking this into account, there is a

[2] www.environmentawards.net
[3] www.icca-chem.org

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

participation rate of 42% for the top 50 logistics service providers for international environmental award schemes.

For the top 50 companies, the involvement rate in international environmental award schemes if ranked by size and numbers breakdown as follows: 1-10 (90%); 11-20 (50%); 21-30 (40%); 31-40 (20%) and 41-50 (10%). It seems that award schemes are particularly interesting for the larger logistics service providers. Looking at the national origin of the logistics service provider, 14 (74%) of the 19 Non-Dutch companies have joined an international award scheme compared to 7 (23%) of the 31 Dutch companies. In addition to these award schemes, 14 logistics service providers (28%) mention they have an ISO14001 certification.[4] Should this be a measure of environmental awareness within the company?

The Lean and Green award scheme was introduced in the Netherlands in 2008. This program focuses on shippers, logistics service providers and city councils. Lean and Green wants to encourage businesses to grow to a higher level of sustainability. They believe that becoming greener will reduce the environmental impact, while simultaneously saving cost. Since its introduction in 2008 the award scheme has gained popularity and 82 shippers, 145 logistics service providers and also 11 city councils have joined the award scheme as of September 2012. Participants must write a plan, which contains precise CO_2 targets for the next five years and determine key (green) performance indicators (website Connekt).

Figure 4 shows the membership for Lean and Green over the years, 2008-2012. The figures for this group most likely will increase over time and have the potential to become the leading standard for sustainable physical distribution in the Netherlands.

Presently, 61% of the members are logistics service providers, 34% are shippers and 5% are city councils. As of September 2012, 82 shippers participated in the Lean and Green award scheme.

This offers us an opportunity to compare innovative strategies and areas for improvement among the participating logistics service providers. Unfortunately the term shipper as defined by Lean and Green is a combination of both shippers and private carriers. Of the 67 (82%) private carriers focusing on internal measures, only two (2%), included customers or logistics service providers in their action plans. Most of the private carriers transport either specific products (milk, fruit juice) or experience unstable demand patterns. Thirty-two (48%) of the 67 private carriers opt for the new driving style, 13 (19%) are looking for larger trucks and 13 (19%) want to use alternative modes of transportation like river barges and rail instead of road transportation. Of the remaining 15 (18%) "real" shippers, 10 (67%) identified that cooperation was a favorite measure. But this group is too small to be used for our research. Private carriers, with only one customer (their own company), have far less problems compared to the average logistics service providers. For now, we will leave them out of our research study.

[4] A family of standards related to environmental management that exists to help organizations (a) minimize how their operations (processes etc.) negatively affect the environment (i.e. cause adverse changes to air, water, or land); (b) comply with applicable laws, regulations, and other environmentally oriented requirements, and (c) continually improve in the above.

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

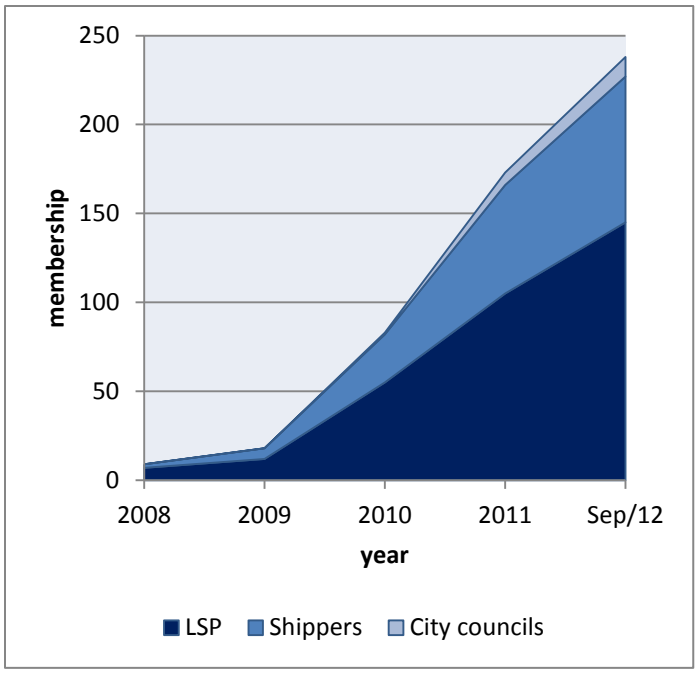

Figure 4. Cumulative membership development 2008 September 2012

All participants in the Lean and Green program must describe how they want to achieve their goal to lower CO_2 by 20% at the end of the five-year-period. A list of measureable actions compiled by logistics service providers include:

- "Het nieuwe rijden" (new driving style), a training for truck drivers to enhance awareness as to how driving (gear changing, braking, speed etc.) impacts CO_2 production
- Buying new and less polluting vehicles
- Reducing energy consumption in warehouses
- Controlling tire pressure
- Monitoring driving speed
- Using alternative modes of transportation
- Using more bio fuels
- Improving loading capacity
- Buying electric vehicles
- Increasing efficiency
- Reducing kilometers driven
- Avoiding empty hauls

In addition to the transport related actions, 51 (35%) indicated they would start with non-transport related actions. These actions include:

- Dimming the lights in the warehouse
- Placing solar panels on the roof
- Recycling water for cleaning cars
- Paperless office and delivery
- Green electricity for the whole company

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

Of the 688 measurable actions, 80 (12%) were non-transport related. We excluded them from our research because they hinder the focus on physical distribution and instead concentrated on the 608 transport related measures.

Logistics Service Providers' Strategy and Sustainability

The next step in our conceptual model examined whether sustainability is included in the strategy of logistics service providers. Is sustainability part of the strategy policy for Dutch logistics service providers? Forty-one (82%) of the top 50 logistics service providers have included sustainability into their mission statements, and mentioned it on their company website. Those who did not mention sustainability were contacted and asked if they would be willing to provide additional information. Consequently, the number rose to 43 (86%). This group has explicitly included sustainability into their core company values. We cannot comment on the group of non-responders. The number found amongst the top 50 is equal to the results calculated from the web survey. Here, 36 respondents (88%) stated that they endorse sustainability.

It can be stated that sustainability has become one of the major driving forces for influencing logistics service providers' behaviour. It also shows that within the transport sector sustainability is not a unique selling point anymore; it has become a common feature. Based upon this information, we consider sustainability to be an essential part of the strategy of Dutch logistics service providers. But how these strategies get translated into actions is a different matter. In this they show whether or not they take sustainability seriously.

Discerning Actions for Achieving CO_2 Reduction: Framework for a Model

The third step in our conceptual model researches the actions proposed by participants in the Lean and Green award scheme and introduces a model to help understand the direction of the proposed measures.

It is not surprising to see that logistics service providers choose a wide variety of approaches to reach sustainability. Every provider, and its business with customers, demands a different, approach (Szekely and Knirsch 2005). So solutions for reducing CO_2 may also be expected to differ depending on the actual situation.

In order to get a better grasp of the discerning measures mentioned by members in the Lean and Green program, they were grouped into the following four categories which are illustrated in Figure 3:

- *Internal Approach* - Measures which will be organized personally by the logistics service provider/shipper.
- *External Approach* - Measures which need cooperation with others outside their own organization (e.g. shippers, governments, competitors, stakeholders etc.).
- *Innovating* - Measures previously unknown to the logistics service provider/shipper.
- *Optimizing* - Measures for improving the efficiency

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

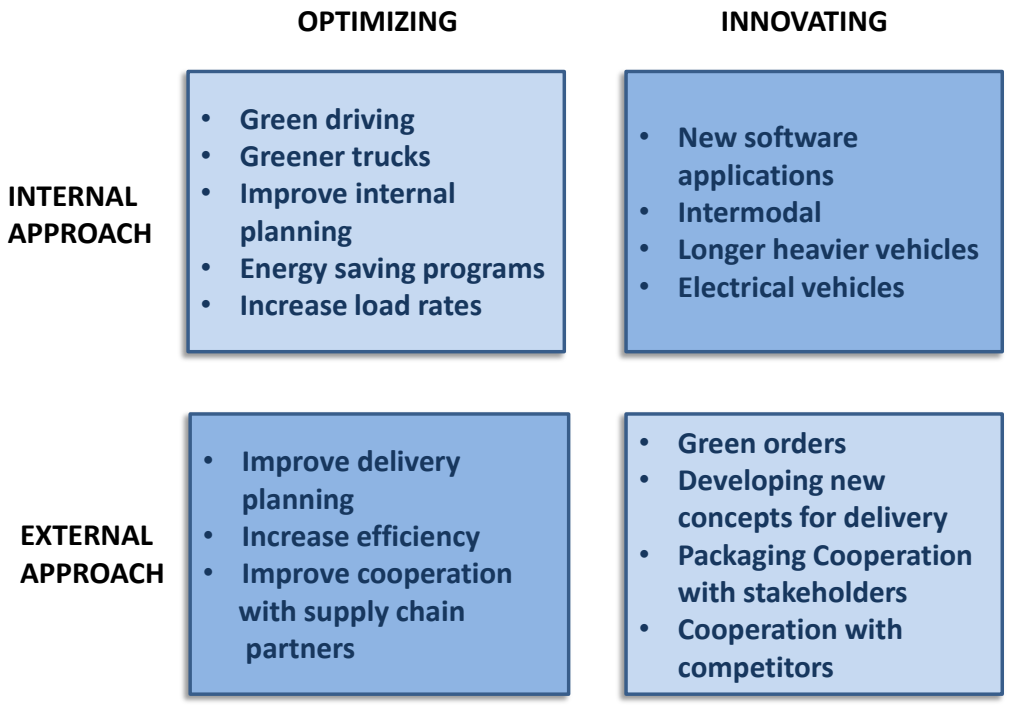

Figure 5. Sustainability activity matrix

This model could be made three dimensional by adding an extra level of the categories, structural and incidental:

Structural - The chosen method is employed for a long time and could be used for any situation.
Incidental - The chosen method might be used just once.

This additional level could give a better insight into the question of whether the logistics service provider can use the experiences gained to improve other (similar) situations at a later date. It is our intention to interview the participants of the Lean and Green award scheme for the purpose of understanding where long term/multi applicable measures differ from short time/one time measures.

The 145 logistics service providers presented a total of 608 measures related directly to physical distribution. When studying their intentions, we found that most improvements were sought internally. For example, (100%) of the participants used internal optimizing measures and 52 (35%) mentioned innovative measures. Teaching staff are often used to initiate more environmental friendly practices: 97 (67%)—mentioned this measure. Other internal measures included: checking tire pressure 11 (8%) and 28 (19%) want to use greener fuel. Of the 608 measures mentioned 442 (73%) had an internal focus, and 166 (27%) had an external focus. External measurements were less popular compared to internal measures. Forty-six (32%)

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

logistics service providers intend to improve efficiency in cooperation programs. Twenty-seven (19%) providers mentioned cooperation with shippers. These programs included ideas such as:

- Awareness programs informing shippers of the CO_2 footprint of their shipments;
- Discussion on delivery time schedules;
- Bundling deliveries to avoid empty hauls.

Twenty-six (18%) logistics service providers mentioned cooperating with other logistics service providers by sharing delivery routes. Of these providers, seven (5%) had programs for both shippers and competitors. External innovative measures were mentioned by 27 (19%) of the providers. Interestingly, we found not one initiative was opted by all. We found this strange given the core of transportation is the same for all logistics service providers. We expected simple sustainable practices to be easily adapted by everyone.

Figure 6 illustrates the distribution of measurements related to physical distribution. It clearly shows that the bulk of measures are focused on internal approaches.

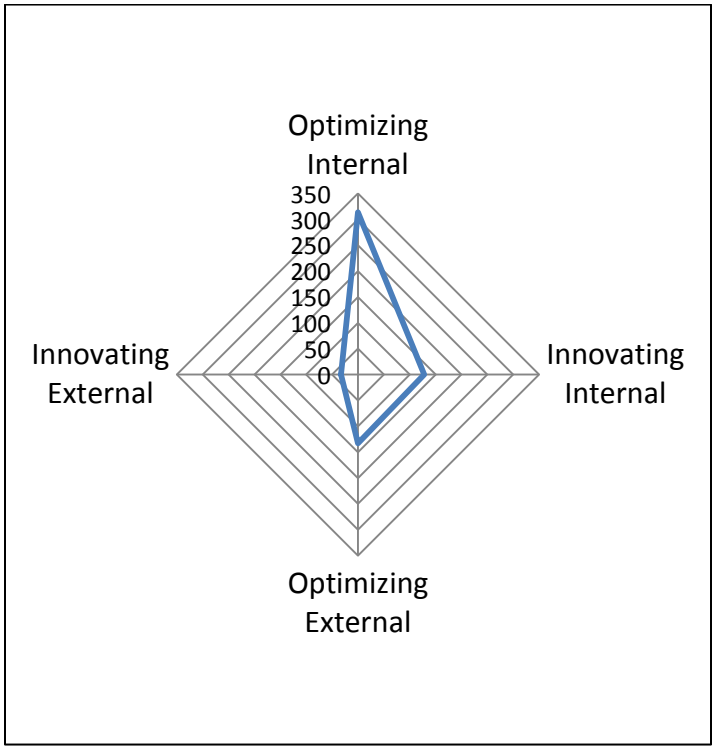

Figure 6. Spread of the measures of LSP

This reluctance to cooperate with shippers is also shown in the web survey. Twenty three (56%) of the respondents stated that shippers will not make any concessions if this includes changing delivery schedules or the use of alternative modes of transportation. According to 31 (76%) of the respondents, the shipper will not make any concession on delivery speed. Apparently, logistics service providers feel that sustainability on its own merit is not a decisive factor for shippers to choose a specific logistics service provider. The main selection criteria of shippers for transport services are definitely price and reliability. This could indicate that logistics service

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

providers have to develop new ideas on how to make transportation more sustainable if they want to keep the interest of shippers.

The web survey also provides an interesting observation on the ideas of cooperation amongst logistics service providers. Asked if they would be willing to share rides with competitors, 27 (66%) of the respondents answered yes. A smaller group of 18 participants (44%) think that their competitors may be willing to cooperate with them. These figures suggest there is potential for cooperation among competitors in the transport sector. When split up into the function of the respondent, a difference between these two groups becomes apparent: 13 of the 14 general managers (93%) say they are willing to combine rides with competitors compared with six of the 14 (43%) respondents working on an operational level. Asked if competitors would be willing to cooperate with them to improve sustainability, eight of the 14 general managers (57%) said yes as opposed to four of the 14 (29%) respondents working on an operational level. Apparently top management has a more positive view concerning cooperation with competitors than those working at an operational level.

It can be concluded that logistics service providers prefer looking for improvement inside their own company and seem less willing to include value chain partners. Logistics service providers also are reluctant to turn to fellow logistics service providers for cooperation. Cooperation with fellow providers is not always successful. For instance, a project in Leiden (the Netherlands) to build a central warehouse for city distribution failed due to the unwillingness of the logistics service providers to work with competitors (Quak 2008).

Conclusions

On the basis of our research, we can draw some conclusions. It can be stated that Dutch logistics service providers do understand the importance of sustainability for the industry. The majority of these providers have included sustainability in the mission and vision of the company and have adjusted the company's strategy to reflect this value. But a common understanding of sustainable physical distribution shared by all stakeholders is not yet developed. The logistics service provider is trapped between the demands for cheap, reliable and clean transportation and reality. This reality has many stakeholders who must be considered in the equation:

1. Government
    a. European Union
    b. Central Dutch government
    c. Local government
    d. Central governments of other countries
    e. Etc.
2. Shippers
3. Final Customers
4. Competitors
5. The Logistics Service Provider
    a. Management
    b. Operational Employees

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

As Dutch logistics service providers attempt to integrate sustainable practices into their business plans they find there are no simple solutions. The measures provided through structured programs (such as Lean and Green) are not adapted by everyone. With so many different solutions for a similar problem, the question could be asked: Does the Dutch logistics service sector perceive this as a manifold problem? After all, every shipper is also a citizen who wants to enjoy good health, beautiful countryside, and perhaps, fewer traffic jams while driving. Multiple stakeholders coupled with conflicting interests and demands makes every situation unique and lacking an ultimate solution. In short, it has all the aspects of being a wicked problem (Rittel and Webber 2012; Levin et al. 2012).

Logistics service providers differ on how to achieve sustainability in physical distribution. This is strange in an industry which shares so much in common with each other. Even providers who operate in the same market show differences in their approach to sustainability. Either there are many ways to achieve the same goal, or there must be room for improvement though a standardization process. The government could play a role (European or Dutch) by acting as a beacon for the transport sector as a whole.

The further development of award programs could connect various stakeholders to each other and help them understand one another's independent motivations and how to best contribute to sustainability in the value chain (Porter and Kramer 2004). Every member must have similar goals. Much can be learned from those involved in award schemes such as Lean and Green. Especially since most of the suggested internal measures such as "green driving" result in quick wins through improved mileage. However, over time these ideas become old news as many copy them. Tackling greater challenges, especially by collaborating with the other primary stakeholders, could provide better and more enduring results. With more stakeholders working with the same aim, wicked problems could become "unwicked" and more manageable.

Further research should provide insight into the impact of the various change— drivers, enablers or barriers (NEA/Cranfield 1994) that make physical distribution sustainable. What role do stakeholders play in how logistics service providers handle sustainability? More can be learned from analyzing logistic service providers who are *first in class* in making transport sustainable. In these case studies (Yin 2009) all partners involved in the physical distribution process should be studied to understand the forces influencing sustainability. With the information obtained through this research, the transport industry could achieve sustainability more efficiently and effectively. It certainly could help to make sustainable physical distribution less "wicked".

References

Ballou, R. H. 2004. *Business Logistics Management*. 5th edition, Upper Saddle River, NJ: Pearson Prentice Hall.

Bask, A. 2001. Relationships among TPL providers and members of supply chains–a strategic perspective. *Journal of Business & Industrial Marketing* 16(6):470-486.

Christopher, M. 2005. *Logistics and Supply Chain Management: Strategies for Reducing Cost and Improving Services.* 3rd edition, Upper Saddle River, NJ: Prentice Hall.

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

Haan, J.A.C. de, Naus, A.J.A.M., & Overboom, M.A. 2011. Management of the 'shipper-logistics service provider' relationship. In K.S. Pawar & H. Rogers (Eds.), Proceedings of the 16th International Symposium on Logistics (ISL 2011): Rebuilding supply chains for a globalize world 302-310. Nottingham: Centre for Concurrent Enterprise, Nottingham

De Ron, A. 2001. *Duurzaam ondernemen: een inleiding*. Deventer, The Netherlands: Kluwer.

Dijkhuizen, B. 2011. Poster met Top 50 LDV-ers is online. www.logistiek.nl [assessed April 20th, 2011].

European Commission. 2011. European strategies. White paper 2011. Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system. Brussels, Belgium: European Commission.

European Commission. 2004. European Energy and Transport Scenarios on key Drivers. Luxemburg, Luxemburg: European Commission.

Francke, J., J. A. Annema, and P. Wouters. 2009. Zuinig met goed op weg: beleid voor efficiencyverbetering in het goederenwegvervoer (Saving on road transportation: policies to improve efficiency in the road freight transport), Kennisinstituut voor Mobiliteitsbeleid. The Hague, The Netherlands: Ministry of Infrastructure and the Environment.

Jeon, C. M., and A. Amekudzi. 2005. Addressing Sustainability in Transportation Systems: Definitions, Indicators and Metrics. *ASCE Journal of Infrastructure Systems* 11(10):31-50.

Kraljic, P. 1983. Purchasing must become supply management. *Harvard Business Review*. 61: (5)109-117.

Lambert, D. M., and R. Burduroglu. 2000. Measuring and selling the value of logistics. *International Journal of Logistics Management*. 11(1): 1-17.

Latour, B. 2005. *Reassembling the Social: An Introduction to Actor-Network-Theory.* Oxford, United Kingdom: Oxford University Press.

Levin, K., B. Cashore, S. Bernstein, and G. Auld. 2012. Overcoming the tragedy of super wicked problems: constraining our future selves to ameliorate global climate change. *Policy Sciences* 45(2): 123-152.

Maloni, M. J., and M. E Brown. 2006. Corporate Social Responsibility in the Supply Chain: An Application in the Food Industry. *Journal of Business Ethics* 68(1): 35-52.

McDonough, W., and M. Braungart. 2002. *Cradle to Cradle: Remaking the Way we Make Things*. New York, N.Y.: North Point Press.

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

Mitchell, R. K., B. R. Agle, and D. J. Wood. 1997. Toward a Theory of Stakeholder Identification and Salience: Defining the Principle of Who and What Really Counts. *Academy of Management Review* 22(4): 853–886.

NEA/Cranfield. 1994. *Future Logistics Structures, the development of integrated supply chain management across 6 industry sectors*. Tilburg, The Netherlands: NEA/Cranfield.

OECD. 1991. Framework for environmental indicators. Paris, France: OECD.

OECD. 1993. Using the Pressure-State-Response Model to develop indicators of sustainability: OECD framework for environmental indicators. Paris, France: OECD.

OECD. 1999. *Working Party on Pollution Prevention and Control, Working Group on Transport Environmentally Sustainable Transport, Final Report on Phase II of the OECD EST Project* Volume 1: Synthesis Report. Paris, France: OECD.

OECD. 2008. *Key Environmental Indicators*. Paris, France: OECD.

Pezzey, J. C. V. 1997. Sustainability Constraints versus "Optimality" versus Intertemporal Concern, and Axioms versus Data. *Land Economics* 73(4): 448-466.

Ploos van Amstel, W. 2008. *Logistiek (Logistics).* Amsterdam, The Netherlands: Pearson.

Porter, M. E., and M. R. Kramer. 2004. Strategy and society: The link between competitive advantage and corporate social responsibility. *Harvard Business Review* 84 (12): 5–12.

Quak, H. J. 2008. *Sustainability of urban Freight Transportation: retail distribution and local regulations in cities*. Rotterdam, The Netherlands: Erasmus University

Rittel, H. W. J., and M. M. Webber. 1973. Dilemmas in a general theory of planning. *Policy Sciences* 4(2), 155–169.

Szekely, F., and M. Knirsch. 2005. Responsible Leadership and Corporate Social Responsibility: Metrics for Sustainable Performance. *European Management Journal* 23(6): 628-647.

Topteam Logistiek. 2011. *Partituur naar de top. Adviesrapport Topteam Logistiek.* The Hague, The Netherlands: Department of Economic.

Van den Broek, F., and. N. Van den Broek-Serlé. 2010. *Green Supply Chain Management, Marketing Tool or Revolution?* NHTV Breda University of Applied Sciences. http://www.logistiek.nl/PageFiles/12981/008_logistiek-download-LOGNWS109613D01.pdf [accessed November 10, 2012].

Van der Meulen, S. J., and M. R. J. Kindt. 2010. *Duurzame logistiek: met welke verladerseisen worden logistieke dienstverleners geconfronteerd.* Amsterdam, The Netherlands:ING.

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

Van Dorp, B., A. P. M. Kempe, and H. R. Commandeur. 1992. *Strategisch marketingmanagement in de transportsector*. Deventer, The Netherlands: Kluwer Bedrijfswetenschappen.

Van Goor, A. R., R. Ploos van Amstel, and. W Ploos van Amstel. 2003. *European Distribution and Supply Chain Logistics*. Groningen, The Netherlands: Stenfert Kroese.

Van Goor, A. R., and W. Ploos van Amstel. 2009. *Distributie logistiek: werken vanuit ketenperspectief*. 3rd edition Groningen, The Netherlands: Noordhoff Uitgevers.

Verweij, K. 2011. Top-100 ldv-ers 2010: Handle with Care. www.logistiek.nl [assessed April 20th, 2011].

Visser, L. 2010. *Thresholds in Logistics Collaboration Decisions: A Study in the Chemical Industry*. Oisterwijk, The Netherlands: BOX Press Uitgeverij.

Vollenbroek, F. A. 2002. Sustainable development and the challenge of innovation. *Journal of Cleaner Production* 10 (3): 215–223.

Weijers, S., B. Kuipers, and J. Beckers. 2002. Industry driven innovation for logistics service providers. *Actes des Quatrièmes Rencontres Internationales de la Recherche en Logistique(*Proceedings of the Fourth International Meeting for Research in Logistics) http://www.airl-logistique.org/fr/files/?view=225 [assessed February 20, 2012].

World Commission on Environment and Development. 1987. *Our common future: the report of the World Commission on Environment and Development*. New York, N.Y. Oxford University Press.

Yin R. K. 2009. *Case Study Research: Design and Methods*. 4th Edition. Thousand Oaks, CA: SAGE

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.