

SUSTAINABILITY AND THE PURCHASING PROCESS FOR PHYSICAL DISTRIBUTION SERVICES

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ABSTRACT

Sustainability in physical distribution has been widely discussed, but academic research has concentrated on how to achieve sustainability and on techniques and measures to improve sustainability. But our understanding of the role played by sustainability during the purchasing process is limited. This is a pity. If sustainability is more as mere words, it needs to find a proper place in KPI's in the service level agreement for physical distribution services. In this way it could be the enabler, for both shipper and logistics service provider, to improve a common understanding of what sustainability means and how it can be achieved. This research paper will define this role and describe the problems which shippers and logistics service providers face when improving the sustainability of physical distribution. It also will show the results of a case study amongst 5 companies and will show that the role sustainability plays in the purchasing process is not clearly cut. At the end we will introduce a survey amongst 20,000 shippers and logistics service providers to gain a better understanding of this aspect.

INTRODUCTION

The logistics sector in the Netherlands is of great economic importance and contributes substantially to the Dutch economy. The added value of logistics for 2010 to the Dutch GDP is estimated at € 40 billion (8.5%), and its contribution to employment is approximately 750,000 jobs (10%). These figures relate to logistics service providing only. The function of logistics in industry, wholesale, health care, etcetera, should be added to that. For several years, sustainability features on top of the agendas of logistics service providers (Ploos van Amstel, 2008). That fits in the general pattern of environmental awareness of all players in logistics - industrial companies, retail, wholesale, transport and authorities alike, all taking initiatives to incorporate sustainability into their operating strategies (De Ron, 2001; McDonough & Braungart, 2002). This is not just a typical Dutch issue. The EU also wants 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 & Van den Broek-Serlé, 2010).

But how do both logistics service providers and principals/shippers succeed in making one aspect of the supply chain, physical distribution (Ploos van Amstel, 2008) more sustainable? What lessons can be learned from those logistics service providers and shippers who are *best in class*? And what can be learned from the way all involved parties deal with sustainability issues in the purchasing process for transportation? After all, if sustainability is not an aspect within the purchasing process for transportation, is sustainability really an important issue for all parties involved or just political correct empty phrases, full of sound and fury. Signifying nothing.

We want to get at results, not just the promised and fine speeches, by investigating the role of sustainability during the various phases of the purchasing process (Van Weele, 2009) of physical distribution services. Does sustainability play a part in all phases of procurement, or is it being ignored in some phases? For reducing CO₂, is there a difference between shippers compared to logistics service providers?

With most literature on sustainable transportation concentrating on techniques of how to improve sustainability (e.g. the articles in the International Journal of Sustainable

Transportation), it is surprising to see that the relationship between shippers and logistics service providers hardly is researched. Andersson and Norrman (2002) are an exception and they do not even mention sustainability! De Haan, Naus and Overboom (2011) describe KPI's to be put in the service level agreements, but do not mention sustainability as one of these KPI's. Kudla and Klaas-Wissing (2012) have made case studies on the role of sustainability in the relationship between shippers and service providers but they don't mention service level agreements. Our study on sustainability and its place in the service level agreement will help to increase our understanding on how to make physical distribution more sustainable.

The main question we will answer is:

To what extent and how do logistics service providers and shippers translate their strategic policy in the field of sustainable physical distribution into activities during the purchasing process of transportation services?

First of all, answering this question requires further investigation into the relationship between what is said and what is done. When a shipper opts for outsourcing physical distribution, the relationship between a logistics service provider and his shipper will be reflected in the juridical contract drawn up to facilitate and clarify future transport orders between the two partners. Such a contract will be made up in the form of a service level agreement, that informs all parties concerned about mutual expectations and what rules do apply (Faber et al., 2009). In order to control the performance, key performance indicators (KPI) will have to be defined, as well as procedures for the calculation and the 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 in the agreed call-off contract. The call-off contracts have to reflect the appreciation of all parties concerned for specific KPI like price, reliability etc. including sustainability. If the call-off contracts represent the view of the companies concerned, sustainability could be considered a top aspect, which decides the choice for a particular logistics service provider. When is opted for insourcing physical distribution what demands are made on the private carrier as far as sustainability aspects are concerned?

This particular research is part of a PhD study in the role of sustainability within physical distribution with the emphasis on determining the drivers, barriers and enablers for the various stakeholders involved in this process.

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 shipper and 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 or the shipper 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 or shipper implements the plan or maintains the status quo.

Using this conceptual framework we want to understand if new types of physical distribution networks or new approaches for transportation 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 or new approaches will result in new demands on physical distribution systems and, this will drive innovations in sustainable physical distribution.

Based on this conceptual model our argument proceeds as follows: First, we present our defense of the concept for "sustainable" physical distribution. Next we introduce the place sustainability has in the demand and in the purchasing process for physical distribution services. We have taken 5 companies as case studies (Yin, 2009) in order to determine our definite hypothesis which will be tested in a survey amongst the members of a national organization which represents the logistics interests of 20,000 companies, producers and traders in the Netherlands. This group will provide us with a good cross section of small, medium and large logistics service providers and shippers and will allow us to get a strong impression of our target group's views.

SUSTAINABLE PHYSICAL DISTRIBUTION

In 2008, transportation was responsible for 21% of all CO₂ 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 CO₂ (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 CO₂ produced (European Commission, 2004; European Commission, 2011; Topteam Logistiek, 2011).

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 & 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 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 (CO₂), sulphur dioxide (SO₂), 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 & 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 CO₂ 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 CO₂.

SHIPPERS VERSUS LOGISTICS SERVICE PROVIDERS

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)

In 2010 we conducted a web survey 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. The results of our web survey gives a similar impression as Christopher (2005) and Van der Meulen and Kindt (2010). 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).

Transportation costs comprise 10% to 25% of the overall costs for a product (Van Goor & Ploos van Amstel, 2009). The higher the percentage, the more transportation becomes a leverage item (Kraljic, 1983) —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. 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.

PURCHASING PHYSICAL DISTRIBUTION SERVICES

Van Weele (2009) distinguishes 6 phases in the process of purchasing a product or a service: define specifications, select supplier, contract agreement, ordering, expediting, after sales.

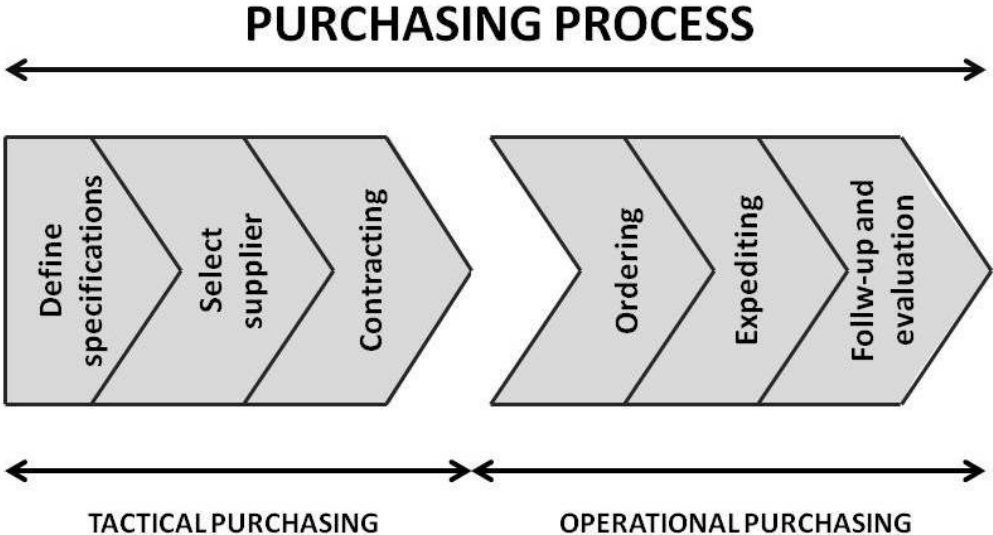


Figure 2 the stages in the process of purchasing
 The first three stages in the purchasing process (define specifications, select supplier, contract agreement) are also called the tactical purchasing process and results in a service level agreement which sets the borders within the individual transport services are demanded. 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.

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).

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 & Kindt, 2010)
- customers demand a higher level of socially responsible behavior from the supply chain partners (Maloni & 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. 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 & Webber, 2012; Levin et al., 2012).

OUR RESEARCH

First, we wanted to make sure if sustainability did play a part in the purchasing process and what that role might be. Therefore we selected for a case study (Yin, 2009) five companies (A, B, C, D and E), which will give us a good insight into the various aspects of sustainability and the purchasing/buying process.

Three are food producing companies (A, B and C) who have outsourced transportation, one (D) is a wholesaler/distributor of food items (fresh, frozen and canned) who has insourced physical distribution and the last is a logistics service provider (E) who is very active in promoting sustainability.

Two (C and D) are subsidiary companies of foreign mother companies, the other three (A, B and E) are Dutch owned. They employ between 700 and 2200 full time employees. We conducted an open structured interview of one hour with six persons whose function varied between logistic manager (A, B, D), manager sustainability programs (C), marketing manager (E) and CEO (A). When asked how did they perceive their own company's experience with sustainable physical distribution they ranked themselves from beginner (A, D) to advanced (B and E) and even very advanced (C).

Some aspects were clear from all six interviewees: the main focus for sustainability was to lower costs. We obtained also interesting information on the role of sustainability during the purchasing process. A and B mentioned that they did not include any references to sustainability in the service level agreement at all. It was an aspect to be considered when selecting logistics service providers, but the price determined the final choice. For company C, sustainability was a major issue and was integrated into the service level agreements, but not always was the service level agreement kept. D has the will to be more sustainable, but finds it difficult to make customers understand that their demands on delivery time and quantity have to change in order to get an improved, more sustainable service. E has developed a special program which compensates for CO₂ emissions. The price is 2% more compared with the normal service. They did promote this program, but only 2% of all customers with 1,5% of all transport movement have adopted it. E also mentioned that sustainability is not an issue when signing service level

agreements. Beside C, none of the others did or experienced any follow up on sustainability at the end of the contract period.

Based on the information obtained from these interviews we can state that the role played by sustainability during the purchasing process of physical distribution is not clearly cut. The service level agreement, which could serve as an enabler, seldom contains performance indicators linked to sustainability. But we still have not found answers to what could make service level agreements a good tool, or where and how sustainability is an issue during the various phases of the purchasing process.

To get insight into these questions, we are developing a survey which will be conducted (July 2013) amongst the members of the EVO, an organization which represents the logistics interests of 20,000 companies, producers and traders in the Netherlands. This survey will allow us to answer:

- 1) Do companies have a vision on sustainability and is this vision translated in a strategy for physical distribution?
- 2) What role does sustainability play in the purchasing process of physical distribution?

We are confident that the findings of this survey will help to improve our understanding of how shippers and logistics service providers deal with sustainability. With this improved understanding, we will be able to help logistics service providers and shippers to build better and durable distribution networks.

REFERENCES

- Andersson, D. & A. Norrman. (2002), "Procurement of logistics services—a minutes work or a multi-year project?", *European Journal of Purchasing & Supply Management*, 3-14.
- 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.
- De Haan, J. A. C., A. J. A. M. Naus, & M. A. Overboom. (2011), "Management of the 'shipper-logistics service provider' relationship", *Proceedings of the 16th International Symposium on Logistics (ISL 2011): Rebuilding supply chains for a globalize world*. K.S. Pawar & H. Rogers (Eds.). (pp. 302-310). Nottingham, United Kindom: Centre for Concurrent Enterprise, Nottingham University Business School.
- De Ron, A. (2001), *Duurzaam ondernemen: een inleiding*, Deventer, The Netherlands: Kluwer.
- 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.
- Faber-de Lange, B, R. Pieters & S. Weijers. (2009), *Inkoop: Werken vanuit een ketenbenadering*, Groningen, Noordhof.
- Francke, J., J. A. Annema, & P. Wouters. (2009), *Zuinig met goed op weg: beleid voor efficiencyverbetering in het goederenwegvervoer*, Kennisinstituut voor Mobiliteitsbeleid, The Hague, The Netherlands: Ministry of Infrastructure and the Environment.
- Jeon, C. M., & A. Amekudzi. (2005), "Addressing Sustainability in Transportation Systems: Definitions, Indicators and Metrics", *ASCE Journal of Infrastructure Systems* 11 (10) :31-50.
- Kudla, N., & Klaas-Wissing, T. (2012), "Sustainability in shipper-logistics service provider relationships: A tentative taxonomy based on agency theory and stimulus-response analysis", *Journal of Purchasing and Supply Management*, 18(4), 218-231,
- Kraljic, P. (1983), "Purchasing must become supply management", *Harvard Business Review*. 61 (5) : 109-117.

- Levin, K., B. Cashore, S. Bernstein, & 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., & 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., & M. Braungart. (2002), *Cradle to Cradle: Remaking the Way we Make Things*, New York, N.Y.: North Point Press.
- 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.
- Pieters, R., H.H. Glöckner, S.W.F. Omta & S. Weijers. (2012), "Dutch Logistics Service Providers and Sustainable Physical Distribution: Searching for Focus", *International Food and Agribusiness Management Review*, 15(B), 107 - 126.
- Ploos van Amstel, W. (2008), *Logistiek*, Amsterdam, The Netherlands: Pearson.
- Rittel, H. W. J., & M. M. Webber. (1973), "Dilemmas in a general theory of planning", *Policy Sciences* 4(2), 155-169.
- Topteam Logistiek. (2011), *Partituur naar de top. Adviesrapport Topteam Logistiek*, The Hague, The Netherlands: Department of Economic.
- Van den Broek, F., & 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., & M. R. J. Kindt. (2010), *Duurzame logistiek: met welke verladerseisen worden logistieke dienstverleners geconfronteerd*, Amsterdam, The Netherlands:ING.
- Van Dorp, B., A. P. M. Kempe, & H. R. Commandeur. (1992), *Strategisch marketingmanagement in de transportsector*. Deventer, The Netherlands: Kluwer Bedrijfswetenschappen.
- Van Goor, A. R., & W. Ploos van Amstel. (2009), *Distributie logistiek: werken vanuit ketenperspectief*, 3rd edition Groningen, The Netherlands: Noordhoff Uitgevers.
- Van Weele, A.J. (2009), *Purchasing and Supply Chain Management*, 5th edition. Cengage Learning Emea, The Netherlands.
- Visser, L. (2010), *Thresholds in Logistics Collaboration Decisions: A Study in the Chemical Industry*, Oisterwijk, The Netherlands: BOX Press Uitgeverij.
- Weijers, S., B. Kuipers, & J. Beckers. (2002), " Industry driven innovation for logistics service providers", *Actes des Quatrièmes Rencontres Internationales de la Recherche en Logistique* <http://www.airl-logistique.org/fr/files/?view=225> (accessed 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. Thousands Oaks, CA: S