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The inclusion of environmental performance in transport contracts

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Abstract

Purpose – The purpose of this paper is to investigate the inclusion of environmental performance in transport contracts, and to study whether differences in inclusion can be explained by managerial involvement.

Design/methodology/approach – The study is based on a survey of shippers and logistics service providers in Sweden. Regression and cluster analysis were used to link managerial involvement to inclusion of environmental performance.

Findings – Companies that include environmental performance in transport contracts do not necessarily consider how to measure the environmental performance and how to handle non-compliance. The most common performance metrics to include are CO_2 emissions and energy use. A higher degree of managerial involvement is related to larger inclusion of environmental performance. Findings also indicate that transportation managers play a very central role for inclusion of environmental performance in contracts.

Research limitations/implications – The paper offers a theoretical contribution to transport contract and performance management theory by expanding it to encompass environmental performance. The authors provide some descriptive and explanatory results in a Swedish context.

Practical implications – The managerial contribution is to show practices and provide an understanding of the use of contracts for environmental performance, which in analogy with previous research can lead to environmental performance improvements.

Originality/value – Few identified studies focus on regulating environmental performance in transport contracts.

Keywords Sweden, Transportation, Contracts, Distribution management, Environment, Transport contracts, Managerial involvement, Performance measurement

Paper type Research paper

Introduction

The performance of logistics systems is typically related to delivery service, logistics cost, and tied-up capital. In addition to these variables and increasingly important, is environmental performance, such as emissions or energy use (e.g. Langley and Capgemini, 2009). Logistics systems are commonly described as sources of increased emissions and there is a heightened demand on managers to consider their environmental performance (Aronsson *et al.*, 2008; Zhu *et al.*, 2008; McKinnon, 2010). A study by Vasileiou and Morris (2006) shows that economic factors tend to be prioritised over environmental and social factors. According to Hervani *et al.* (2005) green supply-chain management performance metrics are virtually non-existent. These statements are further supported by the findings of Cuthbertson and Piotrowicz (2008) describing that performance measurement approaches seldom include environmental aspects. Environmental performance measurement can be a critical

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aspect in logistics service providers' (LSPs) environmental offerings (Martinsen and Björklund, 2010). Measurement can, however, be conducted without actually improving performance (e.g. Darnall *et al.*, 2008). When agreements on e.g. performance are formalised into written contracts and are applied in the supply chain, incentives or penalties can be used to reinforce performance improvements (Lowe, 2007; Forslund, 2009). Transport contracts in supply chains are positively related to performance improvements (e.g. Jammernegg and Kischka, 2005). Chavan (2005) describes it as a shortcoming, that organisations' environmental improvements have been largely operational and tactical instead of strategical. The inclusion of the environmental aspect in the contracts can be a way to incorporate the environmental aspects in companies' long-term strategic thinking.

Transport contracts are applied between LSPs and shippers and are regulating transportation services. However, few identified studies in recent literature deal with contracts that also include environmental performance. One older study by Björklund (2005) shows that even if most of the studied shippers consider the environmental aspect during the purchasing process, only 50 per cent actually include them in the written contract agreement. The environmental performance and management of logistics systems is becoming more and more important (Lieb and Lieb, 2010). The inclusion of environmental performance in transport contracts can contemporarily be expected to be done in differing ways and to differing extent. Questions such as: are measurement agreements included and are incentives or penalties applied, remain unanswered. When little previous research exists, also descriptions are interesting. One aspect in the content of a contract is what performance metrics are included (Forslund, 2009). Environmental performance metrics can typically be emissions and energy use (Hervani *et al.*, 2005). Which environmental performance metrics are included in transport contracts?

A recent study (anonymous during review process) showed that many of those Swedish companies that measure their environmental performance, do it out of internal management purposes rather than external demands. This implies that no regulation forces companies to measure environmental performance. Still an unknown share of companies does so and includes it in contracts. There could be a number of possible explanations, internal or external to the company, as to why companies choose to include environmental performance in their transport contracts. As internal management was found to be a critical purpose for environmental performance measurement in Sweden, internal explaining factors seem to be important. One such internal explanation factor could be found in the managers that promote environmental aspects – referred to as managerial involvement. Due to the need for multidisciplinary knowledge on e.g. transport system design, environmental management, purchasing and contract agreements, Björklund (2005) argued for an involvement of different managers (e.g. environmental, transportation, logistics, and purchasing managers) in environmentally friendly transport purchasing. Furthermore, the importance of top-management support in environmental performance is highlighted by e.g. Hervani *et al.* (2005). This paper studies the impact of the involvement on different managers on the inclusion of environmental performance in transport contracts. Furthermore, the identified knowledge gap calls for the development of scopes for future research.

Managers realise that improving environmental performance in their supply chains is of high relevance, but the knowledge regarding how transport contracts can be helpful is lacking. Little is known about the practices of including environmental

performance in contracts between supply-chain partners, and what affects the inclusion of environmental performance. It is also relevant to study differences between actors in supply chains, in this case LSPs and shippers, to get more knowledge about how they experience the environmental inclusion in the transport contract. The following research questions are formulated:

RQ1. To what extent and with which metrics is environmental performance included in transport contracts?

RQ2. How can the inclusion of environmental performance in transport contracts be explained by different managerial involvement?

The objectives of this study are to describe and explore the inclusion of environmental performance in transport contracts, and to identify whether differences can be explained by different managerial involvement. Underlying objectives are to investigate if differences exist between LSPs and shippers, and to suggest scopes for future research.

Literature review

The literature review is structured after the central concepts; transport contracts, environmental performance metrics, and managerial involvement.

Transport contracts

A contract can be defined as "an agreement between two parties under which one party promises to do something for the other in return for a consideration […] which places obligations on both parties to fulfil their part of the agreement" (Lowe, 2007, p. 318). Contracts are used to provide incentives to coordinate the supply chain, in the absence of an ability to exert direct control over supply-chain partners (Wang, 2002). Contracts are claimed to be especially relevant in market-oriented supply chains where logistics performance is important (Jammernegg and Kischka, 2005). Contracts in supply chains have been found to be positively related to performance improvements (e.g. Jammernegg and Kischka, 2005; Forslund, 2009).

Some identified studies in recent literature deal with transport contracts for environmental performance. Green contracting is not a new concept, and is sometimes used as a synonym for environmentally preferable purchasing or sustainable procurement (Reefe *et al.*, 2008). Buyers can encourage the provision of environmentally friendly products and reduction in packaging by including environmental criteria in contracts (Walker *et al.*, 2009). Even if shippers put effort into investigating the environmental performance and status of LSPs, these investigations have shown little or no influence on the content in the written contract (Björklund, 2005; Wolf and Seuring, 2010). Wolf and Seuring (2010) present two empirical examples: one company (American athletic footwear) trying to include agreements regarding the costs of the CO_2 emissions of the logistics system in the contract. Another (American IT company) had the goal of reducing CO_2 emissions in the contract and in a case of non-compliance, fines, or even contract termination could result.

Forslund (2009) shows the importance of clearly describing which performance metrics should be included in the contract. Furthermore it is relevant to include how those performance metrics should be measured (Forslund, 2009). Also what kind of enhancements (incentives or penalties) that should be applied in cases of

non-compliance (Lowe, 2007; Forslund, 2009) should be included. Findings from a survey study by Björklund (2005) show that even if most of the studied shippers consider the environmental aspect during the purchasing process, 50 per cent actually include them in the written contract agreement, 13 per cent include how to measure them, and only 2 per cent have written agreements regarding how to handle differences e.g. non-compliance. Non-compliance can be viewed both in a positive and in a negative way, resulting in incentives or penalties.

Environmental performance metrics

The performance of logistics systems is typically related to delivery service, logistics cost, and tied-up capital. In addition to these metrics, environmental performance is expected to grow in importance (Langley and Capgemini, 2009; Forslund, 2012). A growing number of companies have begun developing and using environmental sustainability metrics (Veleva *et al.*, 2003). Furthermore, several studies promote the use of interlinked economical and environmental performance metrics. Facanha and Horvath (2005) use both economic and environmental metrics in their life cycle analysis of logistics outsourcing. Also Zhu *et al.* (2008) show examples of environmental metrics that are linked to economic performance.

Some more frequent environmental performance metrics found in the literature are fill rate/loading factors (Wu and Dunn, 1995; McKinnon, 2008). Technology is mentioned by e.g. Wu and Dunn (1995), describing the implementation of information systems and computer models for fleet management as efficient ways to decrease the environmental impact from transport. Other technological metrics can regard the age of vehicles and the fuels, engines, refrigerants, and tyres used (Björklund, 2005; Martinsen and Björklund, 2010). Air emissions and outlets of CO_2 are mentioned by several scholars (e.g. Veleva *et al.*, 2003; Hervani *et al.*, 2005; Langley and Capgemini, 2009; Rogers and Weber, 2011). Finally energy use is pointed out as a frequent environmental performance metric by e.g. Veleva *et al.* (2003), Hervani *et al.* (2005), and Zhu *et al.* (2008). The survey study by Björklund (2005) indicates that fill rate and consolidation are environmental aspects largely focused when purchasing transport services. Second most important is the technology used. CO_2 emissions are also targeted but only to a smaller extent.

Managerial involvement

We are interested in studying the impact of different types of managerial involvement in environmental work, especially in contracts. It is, however, difficult to grasp literature in this area. Most studies do not mention the involvement of different managers. Contract literature mainly mentions customer and supplier (e.g. Jammernegg and Kischka, 2005; Lowe, 2007). An explorative study by Björklund (2005) of managerial involvement in the selection of environmental demands to place in the purchase of transport services indicates a large involvement of environmental-, transportation-, and purchasing managers together with top management. One shortcoming identified in that study, is that commonly only one functional manager is involved in the selection.

Handfield *et al.* (2002) find more and more expectations on purchasing managers to include environmental aspects in their purchasing decisions. Forslund (2009) studies purchasing managers of shippers in a study of logistics contracts, however, not focusing on environmental metrics. Griffis *et al.* (2004) determine that it is the logistics manager who chooses which metrics fit the organisation and is responsible for

measuring environmental metrics. In 2007, Griffis *et al.* stress that it is the middle- and top management that is responsible for the use of measurement and control of its implementation. Different managerial involvement between shipper (the buying company) and LSP (the supplying company) can further be expected.

Methodology

This section contains information on survey instrument, sample profile, and analysis methods. The ways to ensure validity and reliability are described through this section and are summed up in the conclusions section.

Survey instrument

A web-based survey is used to collect empirical data. To ensure both content and construct validity, as recommended by Flynn *et al.* (1990), scales are drawn as much as possible based on the literature review. The inclusion of environmental performance in the contract is operationalised by using response alternatives as included, measurement included, and non-compliance included in written/documented contracts. The environmental metrics applied in the companies' logistics performance are operationalised as fill rate, technology, CO_2 emissions, and energy use. The managerial involvement is operationalised as the active promotion of including environmental aspects by different job titles: environmental, logistics, purchasing, and transportation manager plus top management. The questions are answered on a five-point Likert scale ranging from totally disagree (1) to totally agree (5) plus "do not know". Before sending it out, the survey is pre-tested for content validity and reliability, sending it to four practitioners (potential respondents) for answering and returning the survey. Follow-up interviews complete the pre-test, to get comments regarding the content, word use, readability, sequence of the questions, etc. These tests found no need for changes for the questions applied in this study.

Sample profile

Two different groups of respondents are targeted: LSPs and shippers. The survey is sent to 114 LSPs (all members in one Swedish transport interest group – Transportgruppen). The efficient response rate for the LSP survey is 52 per cent. The survey is also sent to 1.612 shippers (members in or customers of a Swedish purchasing network – SILF). This respondent group did not focus any particular sector or company size; all respondents have the common determiner that they purchase transports. After one reminder, 103 shippers had answered the survey; however, it came to our knowledge that over 500 surveys were caught in spam filters never reaching the potential respondents. The efficient response rate is therefore at least 10 per cent for the shippers, and 13.4 per cent in total. Although this response rate can be characterised as relatively low, past studies within sustainability research report similar response rates (Melnyk *et al.*, 2003; Pullman *et al.*, 2009). Furthermore, the sample size allows for conducting statistical analyses (Hair *et al.*, 2006). Non-response bias, as defined by e.g. Lambert and Harrington (1990) is investigated by a comparison between early and late responses to the survey, based on the argument that late respondents are more like non-respondents than early respondents. No significant differences are found, indicating that the responses are representative of the entire sampling frame, which increases the reliability. Due to the use of anonymous web-based surveys, it was not possible to carry out other forms of non-response bias analysis, such as calling a subsample of non-respondents, or comparing the sic codes of

respondents to the sic codes of the sampling frame. It might be that the survey to a larger extent is answered by respondents with an interest in this field.

Analysis methods

Independent samples *t*-tests are conducted to identify significant differences between the responses from LSPs and shippers. Paired samples *t*-tests are applied in order to identify significant differences in variables' mean values. *t*-tests are applied for variables on Likert scale (Hair *et al.*, 2006). In order to classify, first, the way environmental performance is included in the contract and second, different forms of managerial involvement, *K*-mean cluster analyses were applied. A cross-tabulation on the cluster groups identified is made in order to display the relationship between inclusion of environmental performance and managerial involvement. χ^2-tests are used to identify significant relations between variables on nominal or ordinal scale (Hair *et al.*, 2006) and is also used in cross-tables. The cluster- and cross-table analyses are supported by a step-wise regression analysis aiming to identify relations between the inclusion of environmental performance (dependent variables) and managerial involvement (independent variables), but also to deepen the understanding regarding the role of different managerial involvement. The analyses are conducted following the principles of Hair *et al.* (2006). The use of established analysis methods and tests increases the reliability of the study.

Findings and discussion

The inclusion of environmental performance in transport contracts

Out of the 163 responses, 84 have environmental performance included in the transport contract, as shown in Table I.

The share of companies with environmental performance included in transport contracts is 52 per cent, which corresponds perfectly to the 50 per cent share found by Björklund (2005). In all, 72 per cent of the LSPs and 40 per cent of the shippers state this inclusion. Totally, 47 per cent have measurement included and 42 per cent have non-compliance included in transport contract. This is a large increase as compared to the 13 and 2 per cent, respectively, found by Björklund (2005). It is obvious that the environmental performance of logistics systems is growing in importance, as mentioned by Lieb and Lieb (2010).

The independent samples *t*-tests show no significant differences between LSPs and shippers regarding inclusion, measurement, and non-compliance. The paired samples *t*-tests, however, indicate significantly higher means (level of significance 0.05) for the

Type of inclusion of environmental performance	Type of company	*n*	Mean	SD	*t*	Significance (two-tailed)
Included	LSP	43	3.21	1.46	−1.03	0.307
	Shipper	41	3.51	1.23		
Measurement included	LSP	38	2.76	1.39	−0.98	0.330
	Shipper	38	3.08	1.42		
Non-compliance included	LSP	39	2.85	1.41	−0.15	0.880
	Shipper	30	2.90	1.54		

Table I. Type of inclusion of environmental performance in contracts

inclusion of environmental performance as compared to the inclusion of measurement and non-compliance; to include green aspects does not necessarily mean that measurement and non-compliance are included. This implies that contracts are not complete in their contents in the way suggested by Forslund (2009). This may in turn imply that the expected performance improvement effects are not reached.

A cluster analysis is then conducted. The respondents are clustered in three groups based on the mean values of the type of inclusion of environmental performance in the contracts (Table II).

The first cluster shows that the 20 respondents who to a large extent include environmental performance in the contract, also to a larger extent consider how to measure the performance and how to handle non-compliance (cluster group 1). Vice versa, low consideration of environmental performance in the contract logically results in low consideration of measurement applied or how to handle non-compliance (cluster group 3, only 15 respondents). The largest group (31 respondents) includes environmental performance to a medium extent. However, this "medium" group shows larger inclusion of environmental performance (cluster centre 3.52) as compared to the inclusion of measurement (cluster centre 2.71) and non-compliance (cluster centre 2.58). This indicates that the significant differences regarding the inclusion of environmental performance as compared to measurement and non-compliance identified in the paired samples *t*-test above can be explained by the behaviour in this group alone.

Environmental performance metrics applied

The environmental performance metrics applied in transport contracts are shown in Table III.

Type of inclusion of environmental performance	Final cluster centers (1) Large inclusion	(2) Medium inclusion	(3) Low inclusion
Included	4.60	3.52	1.40
Measurement included	4.55	2.71	1.33
Non-compliance included	4.55	2.58	1.27
Number of cases/cluster	20	31	15

Table II. Cluster analysis of inclusion of environmental performance

Type of environmental metrics	Type of company	*n*	Mean	SD	*t*	Significance (two-tailed)
1. Fill rate	LSP	23	3.87	1.10	0.83	0.411
	Shipper	34	3.53	1.75		
2. Technology	LSP	23	4.04	1.36	2.39	0.020*
	Shipper	34	2.88	2.04		
3. CO_2 emissions	LSP	23	4.56	0.84	1.94	0.057
	Shipper	34	3.76	1.84		
4. Energy use	LSP	23	4.22	1.24	0.42	0.674
	Shipper	34	4.06	1.48		

Note: *Significant at $p < 0.05$ level

Table III. Environmental performance metrics applied

The independent samples *t*-tests identify significant ($p < 0.05$) differences between LSP and shippers only on the metric technology, and on the limit to significance for CO_2 emissions. It seems logical that LSPs rate technology higher than shippers, given that LSPs commonly own the technology that causes the environmental impact from transport. Technology can be related to vehicles, fuels, engines, and tyres (Björklund, 2005) or to information systems for fleet management (Wu and Dunn, 1995). Our findings indicate that the other metrics are of similar importance to LSPs and shippers.

The paired samples *t*-tests are applied to test for differences in the type of environmental performance metrics applied. Significantly higher mean values for the use of CO_2 emissions and energy use metrics are found, compared to metrics regarding fill rate and technology. CO_2 emissions being an important metric is supported by Veleva *et al.* (2003), Hervani *et al.* (2005), Langley and Capgemini (2009), and Rogers and Weber (2011). No significant differences are found comparing the use of fill rate and technology or comparing CO_2 emissions and energy use.

Managerial involvement

Seventy-four of the respondents address the question on managerial involvement, on the degree of active promotion of environmental aspects in logistics by different managers. As shown in Table IV, all types of managers have a high degree of involvement in promoting environmental aspects. LSPs have significantly higher involvement of environmental managers ($p < 0.05$) and top management ($p < 0.1$) as compared to the corresponding involvement at shippers. Transportation managers are significantly ($p < 0.05$) more involved in shippers' environmental work as compared to LSPs. Differences could be expected as we study one buying and one supplying company.

Due to the significant difference between LSPs and shippers regarding the involvement of several managers, paired samples *t*-tests (level of significance 0.05) are conducted for each group separately. At the LSPs, higher involvement of environmental and logistics managers is found as compared to purchasing and transportation managers. At the shippers higher involvement of transportation and logistics managers is found, as compared to environmental and purchasing managers together with top management. This analysis further supports the differences in involvement between LSPs and shippers as identified in the independent samples *t*-test.

Type of managerial involvement	Type of company	*n*	Mean	SD	*t*	Significance (two-tailed)
Environmental manager	LSP	39	4.36	1.18	2.05	0.044*
	Shipper	35	3.77	1.29		
Logistics manager	LSP	34	4.18	0.97	0.10	0.924
	Shipper	39	4.15	1.04		
Purchasing manager	LSP	26	3.73	1.37	0.17	0.870
	Shipper	34	3.68	1.17		
Transportation manager	LSP	30	3.23	1.61	−2.39	0.020*
	Shipper	32	4.10	1.20		
Top management	LSP	37	4.08	1.21	1.77	0.081
	Shipper	32	3.56	1.22		

Note: *Significant at $p < 0.05$ level

Table IV.
Managerial involvement

After this a cluster analysis is conducted. The respondents are clustered into three groups based on the mean values of managerial involvement (Table V).

Cluster group 1 (the largest group) contains respondents with a high level of involvement (mean above 4.0) from most managers studied. The exception is a lower cluster centre regarding top-management involvement. Cluster group 3, on the other hand, contains respondents with a low-managerial involvement (centre group mean below 3.0). Cluster group 2 contains respondents with a medium involvement (mean between 3 and 4) of the environmental, logistics, and purchasing manager. However, this group has the largest cluster centre regarding top-management involvement, and the lowest cluster centre regarding the involvement of the transportation manager. A pattern seems to be that top management compensates for low involvement of other managers and vice versa. Despite the significant differences between the managerial involvement between LSP and shippers, a cross-tabulation among the three clusters identified the type of company, and showed no significant differences, tested with a χ^2-test, in company type being "overrepresented" in the clusters identified.

Explaining inclusion of environmental performance by managerial involvement

A cross-tabulation between the clusters identified in the two previous cluster analyses (managerial involvement and inclusion of environmental performance in contracts) shows strongly significant relations (level of significance 0.007) suggesting that a high level of managerial involvement also results in larger inclusion of environmental performance in contracts (Table VI). This is an important finding of the study.

Table V.
Cluster analysis of managerial involvement

Type of managerial involvement	Final cluster centres 1. Large involvement	2. Medium involvement	3. Low involvement
Environmental manager	4.78	3.50	2.55
Logistics manager	4.57	4.43	2.73
Purchasing manager	4.35	3.64	2.09
Transportation manager	4.78	3.07	3.09
Top management	3.87	4.07	2.36
Number of cases in each cluster	23	14	11

Table VI.
Cross-tabulation between the managerial involvement clusters and the inclusion of environmental performance clusters

		Managerial involvement (1) Large involvement	(2) Medium involvement	(3) Low involvement	Total
Inclusion of environmental performance in contracts	1. Large inclusion	12	3	1	16
	2. Medium inclusion	7	8	4	19
	3. Low inclusion	1	2	4	7
	Total	20	13	9	42

Note: Significant at $p = 0.017$ level

However, this analysis only shows the importance of significant managerial involvement, not which functional managers' promotion is most critical. We therefore decide to continue the analyses with a regression analysis, as shown in Table VII.

The results show that top management is not as critical for the inclusion of environmental performance as seen in literature (e.g. Hervani *et al.*, 2005; Griffis *et al.*, 2007), as long as this is compensated by other managers. Neither are environmental nor logistics managers critical, contradicting the suggestions of Griffis *et al.* (2004). Transportation managers, however, are important for the inclusion of environmental performance measurement and non-compliance. This seems not to be mentioned in literature. Purchasing managers are critical for inclusion and measurement, which can support the findings of Handfield *et al.* (2002).

Concluding discussion and scopes for future research

This study investigates the inclusion of environmental performance in transport contracts, and studies whether differences in this inclusion can be explained by managerial involvement. Findings from a survey study targeting LSPs and shippers suggest that those who include environmental performance do not necessarily consider how to measure the environmental performance and how to handle non-compliance. This may imply that performance improvements are not reached. The most common performance metrics to include are CO_2 emissions and energy use. A higher level of managerial involvement is related to larger inclusion of environmental performance in contracts. Findings also indicate that transportation managers play a more important role for inclusion of environmental performance in contracts, as compared to top management and environmental managers. We also see a "typology" where companies either have a high level of involvement by top management together with a low level by other functional managers, or vice versa; companies have a low level of involvement by top management and a compensating high level from other functional managers.

The findings in this study also suggest differences between actors in the supply chain: LSPs and shippers. This could be expected as we study one buying and one supplying

Dependent variables – inclusion of environmental performance	Independent variables – managerial involvement	*B*	R^2	*F*	Tolerance
Included	Environmental manager	0.144	0.101	5.031	1.000
	Logistics manager	0.092			
	Purchasing manager	0.317*			
	Transportation manager	0.230			
	Top management	−0.030			
Measurement included	Environmental manager	0.092	0.329	10.303	0.939
	Logistics manager	0.054			
	Purchasing manager	0.325*			
	Transportation manager	0.399**			
	Top management	−0.013			
Non-compliance included	Environmental manager	0.059	0.150	7.221	1.000
	Logistics manager	0.092			
	Purchasing manager	0.206			
	Transportation manager	0.387**			
	Top management	0.091			

Notes: *,**Significant at $p < 0.05$ and $p < 0.01$ levels, respectively

Table VII.
Regression analysis, linking managerial involvement to inclusion of environmental performance

company with different traditions. A larger share of LSPs state that they included environmental performance in contracts; they seem to be more aware and have it "at the top of their agenda". One explanation can be found in the fact that transportation often is a core activity for the LSP, and therefore ought to be in focus in their environmental management. We offer a theoretical contribution to transport contracts and performance management theory by expanding it to encompass environmental performance. We provide some descriptive and explanatory results. The managerial contribution is to show practices and provide an understanding of the use of contracts for environmental performance, which in analogy with Jammernegg and Kischka (2005) and Forslund (2009) can lead to environmental performance improvements.

There are several limitations related to the study. Even if the survey questionnaire is based on the literature review, only few related previous survey studies are found. This implies that new scales are developed or adjusted for some variables. The data collection could also contain some bias, since all questions are interpreted by a single respondent and all answers are the respondents' perceptions. It might also be that the survey to a larger extent is answered by respondents with an interest in this field. The sample size is relatively small; however, the response rate is not too low as compared to similar studies, research based in the small country Sweden seldom shows large sample sizes and the sample size meets the requirements of the statistical methods applied. The findings are based on empirical data from Swedish LSPs and shippers, and could consequently be limited to specific Sweden circumstances. They show a "snapshot picture" of green practices – it is acknowledged that a lot of development is going on. We have, however, followed established procedures throughout the study and feel confident in the validity, reliability, and the conclusions drawn.

Scopes for future research could include the following questions. To complete the knowledge from the survey, we would like to carry out deeper case studies to get more detailed knowledge of the contents in the contracts – how are metrics defined, how are they measured and analysed, how is non-compliance handled and by whom of the supply-chain partners? Such a study would build on the multiple case study methodology and research model of Forslund (2009), but expand it towards environmental performance. The current study did not shed light over actual target setting or results. Therefore we would like to nuance the green ambitions – how high are environmental targets actually set? Is it more difficult to handle high demands? Which results are reached and what characterises those who succeed? Also this study would require a multiple case study. It could give valuable practical contributions to managers striving to improve environmental performance. Using survey methodology, it would be interesting to conduct comparative studies, both in other national contexts and later in time. Such studies could pinpoint differences and development.

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