How to Implement Green Logistics – Using Improvement Processes for Increasing Environmental Initiatives in Freight Transport Companies

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Abstract

Purpose: The purpose of this paper is to explore the possibilities of using improvement systems based on process management for increasing environmental initiatives in freight transport companies.
Methodology: The study was conducted by researchers from quality management and green logistics together with two Swedish freight companies, as a combination of case study and action research. Data were gathered through observations, interviews, document studies and workshops, over an eighteen-month period.
Findings: The paper presents findings about how to implement improvement processes and the impact on environmental initiatives.
Research implications: The study brings new knowledge about a previously under-researched topic; how to implement green logistics. Tools used for process management and improvements are applied in a novel context – the freight transport sector. Furthermore, the action-oriented approach proved to be pragmatic and effective.
Practical implications: This paper contributes with findings on how to establish processes and implementing improvement systems in the freight transport sector. Additionally, the action research approach provides the opportunity to develop the business in cooperation with researchers.
Originality: In this unique study, methods and tools from the quality management sector are applied to a new context – the freight transport sector – to improve the environmental sustainability.

Keywords
process management; environmental sustainability; freight transports; improvement processes

1. Introduction

Even though logistics is essential to the business world, it has been long known for its negative impact in the environment. Among logistics activities, freight transports have the largest contribution to the negative environmental emissions from logistics (Wolf and Seuring, 2010). The freight transport sector, which is the business sector that mainly operates transports in logistics systems, is aware of this issue and has tried to decrease its environmental footprint by implementing different environmental practices (e.g. Martinsen and Huge-Brodin, 2014). However, the efforts for greening logistics have been relatively slow (Isaksson, 2014) and there is a lack of tools that support the business sector in their quest towards increasing their environmental sustainability (Evangelista et al., 2013).

Some researchers have mentioned the importance of customer satisfaction, cost reduction and environmental sustainability in the transport sector and the trade-offs between them (Wolf and Seuring, 2010; Sallnäs 2016). These same researchers highlight the prioritization that the transport sector gives to cost and quality before environmental sustainability. They explain this prioritization with the customer requirements, i.e. customers of the sector require good quality services at a low cost. The environmental aspects are usually left out of the equation for decision-making.

Process management is a structured way of managing a business or a public organisation based on processes. The purpose is to achieve customer satisfaction and continual improvements while increasing efficiency, profitability and employee satisfaction (Paim et al., 2008; Palmberg, 2009). This methodology has proved to be successful in other business sectors. It has even proven to be helpful for providing the structure to measure environmental impact for certain companies. Albeit, its use has not been researched in depth, specifically for increasing environmental sustainability in the freight transport sector (Navarro et al., 2018).

The purpose of this paper is to explore the possibilities of using improvement systems, based on process management, for increasing environmental initiatives in freight transport companies.

For achieving this purpose, we designed the following research questions.

RQ1: How could improvement processes facilitate environmental initiatives in freight transport companies?

RQ2: What are the challenges of implementing improvement processes in freight transport companies?

RQ3: What are the potentials of implementing improvement processes in freight transport companies?

2. Frame of reference

The frame of reference consists of two domains; process management and environmental sustainability of freight transports.

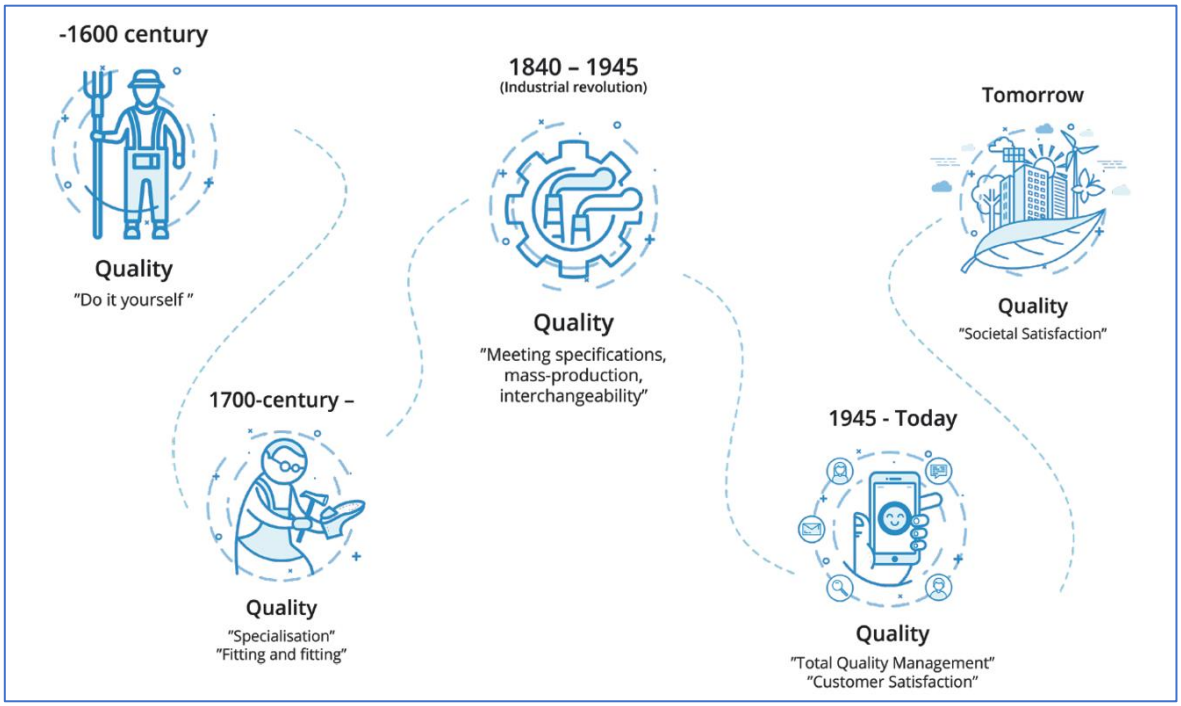
2.1 Process management. From customer satisfaction to societal satisfaction.

Process management is based on the framework and values of Total Quality Management, TQM (Shewhart, 1931, 1939; Juran, 1998; Bergman and Klefsjö, 2010). While the word *process* can be used with many different meanings, in this context a process is defined as: *A chain of activities which creates value for a customer*. The keywords are *activities* and *customer*. The words emphasise external focus on delivery and customer satisfaction, in

contrast to internal focus on costs and organisational responsibilities (Bergman and Klefsjö, 2010; Cronemyr and Danielsson, 2013). A widely accepted standard for quality management systems is the ISO9001 standard, which requires organisations to apply a process approach to management, operations, and support. One of the most commonly mentioned success factors for implementing new management ideas is management commitment (see e.g. Antony and Banuelas, 2002; Cronemyr, 2007), which applies directly to process management. In various contexts such as industrial production, service and healthcare, process management practices have been applied and proved to be successful. However, process management has only been applied sparsely within the logistics and freight transport sectors (Navarro et al., 2018).

The quality concept has evolved during the years. As Deleryd and Fundin (2015) describe, it has evolved from "do it yourself", via specialisation and industrialisation, to customer satisfaction, see Figure 1 below.

Figure 1. The development of the quality concept



Source: Deleryd and Fundin (2015)

The next step according to Deleryd and Fundin is "societal satisfaction" which is a quality practitioner's view on the broader picture of sustainability including environmental, social and economic sustainability (Brundtland Report, 1987). The main idea of Deleryd and Fundin (2015) is to widen the customer concept to include many more stakeholders with more societal and long-term demands, but that the tools and techniques of quality management still apply. We argue that, as the quality concept evolves, so does the need for quality management – and specifically process management – to evolve.

Focusing on customer satisfaction is the backbone of process management. Various process maturity models have been proposed (see e.g. Lockamy and McCormack, 2004; Cronemyr and Danielsson, 2013). Cronemyr and Danielsson (2013) presented a stepwise approach, process

management 1-2-3, for achieving a successful implementation and full effect of process management.

The three steps in process management 1-2-3 (Cronemyr and Danielsson, 2013) are described below.

1. Process mapping and development
   Purpose: Established processes
   Activities: Gaining management awareness and commitment; establishing main processes, appointing process owners and teams; mapping and developing process maps with steering and supporting documents, publish maps and documents in on-line management system; communication and teaching of employees, setting up system support.
2. Process analysis and improvement
   Purpose: Improved processes
   Activities: Identifying problems and opportunities by means of employee improvement suggestions, customer feedback, measurement analysis, external and internal audits; clustering and prioritisation of improvement areas; appointing improvement teams and selection of improvement methodology; conducting improvements by team with the selected methodology.
3. Strategic process control
   Purpose: Controlled processes
   Activities: Collect data and update control charts for KPIs (i.e. strategic result variables) and control variables (established in step 2); analyse and classify deviations; take actions (steering and control); improve process (analysis and improvements, if needed).

Cronemyr and Danielsson (2013) showed that, by doing 'the right things' in 'the right order', risks of failing when implementing process management are reduced. In all steps the activities are designed with focus on customer satisfaction, even when activities may be considered more internal than external.

In this paper we present how focus on customer satisfaction in the first two steps may evolve into societal satisfaction, while focusing on environmental sustainability in the freight business. How the third step could be transformed will be investigated and evaluated in a subsequent study.

2.2 Environmental sustainability and freight transports.

Environmental sustainability of logistics is often referred to as green logistics. Various means of greening transport and logistics include changing logistics structures, changing transport modes, and increasing efficiency by increasing fill-rates (Aronsson and Huge-Brodin, 2006; McKinnon, 2015; Rogerson and Sallnäs, 2017, Bask and Rajahonka, 2017). While these means relate to logistics systems at large including different actors, other means relate more directly to the freight transport sector, such as fuel selection, engine selection and technical development relating to vehicle design and capacity (McKinnon, 2015; Pålsson et al., 2017; Johannes et al., 2018).

Environmental sustainability must, in a freight transport company, be seen in the context of profitability and financial sustainability (Huge-Brodin, 2012). In this equation, the customer's role is ambiguous. While the freight transport company needs to provide competitive services preferably as environmentally as possible, the customer represents multiple obstacles to the development (Isaksson, 2014). Multiple studies have confirmed customers' unwillingness to pay more for greener services (Isaksson, 2014; Evangelista et al. 2017). Hence, freight transport

companies need to find ways to increase their environmental sustainability that do not infringe the financial side of their operations.

For environmental initiatives to prosper in companies, research points to the need for collaboration and a proactive attitude among employees (Wan Ahmad et al., 2016). In the freight transport sector, environmental initiatives appear to be addressed to some extent on a top management level, however the responsibility is seldom shared with other departments or functions (Evangelista et al., 2017). This underlines the need to find tools that can not only support an efficient inclusion of environmental initiatives per se, but also support them being managed throughout the operations in the company.

While process management may be such a tool, its use within the freight transport sector is very limited, and in particular its application for increased environmental sustainability (Navarro et al., 2018). Although improvements *per se* have been suggested as well as assessed in prior research, environmental improvements in the freight transport sector have not been studied with a process perspective.

3. Method

3.1 Case study with an action-oriented approach

Due to the nature of research questions we designed a multiple case study (Yin, 2013). Mitra (2014) mentions the need of research in sustainable supply chain management, where transport provision is an important part, which requires a more exploratory and case study based approach. The main case study was conducted at two Swedish freight transport companies, designated Haulier and Forwarder. The companies were selected due to their interest and efforts towards environmental sustainability. We conducted the case study of the two companies by onsite interviews, document studies, observations and workshops.

Interviews. In this phase of the research project we conducted interviews that were personal and semi-structured, since we used an action-oriented approach (Westlander, 2000). Administrative personnel were interviewed based on their role in the company. Each interview was recorded with permission of the interviewee. The information was summarized in semi-transcript documents and sent to each interviewee for reflections and confirmation of the veracity of the information. Hence, we ensured the level of the information gathered and strengthen the validity of the collected data (Yin, 2013).

Documents and observations. We directly observed each company through field visits, six full days during autumn 2017 and spring 2018. Observations were done by the three researchers to increase the reliability of the observational evidence (Yin, 2013).

We developed and suggested forms for improvement suggestions and customer feedback. They were reviewed and tested by the companies. The forms were distributed by management and we later studied those forms that had been filled in by employees.

3.2 Analysis and workshops

The documents were analysed and, in some cases, suggestions were given back to the company how the suggestions could be classified and developed further. The problems that employees and management expressed during interviews were analysed based on how far they had come in the implementation of the process management framework, and suggestions from the researchers were given during workshops.

As we, the researchers, took on an active role in preparing forms, conducting workshops, and suggesting actions to the companies based on research, this was clearly an action research approach (see e.g. Lewin, 1947; Gummesson, 2000; Westlander, 2006 and Cronemyr, 2007).

4. Case studies

In this section, we present the two case studies, Haulier and Forwarder. The case studies were developed at two Swedish freight transport companies, one for each case study. The selection of the companies was based on their proficiency in environmental sustainability, their willingness to cooperate with the researchers and the approachability of the management. This section is divided in two parts, one for each case study.

As mentioned by Cronemyr and Danielsson (2013), in process management, process development should precede process improvement. Following this reasoning, we describe each of the case studies in two segments. The first one describes the process development status before the involvement of improvement process. The second segment presents the results from the implementation of improvement processes. Additionally, we include a third segment with the findings from the connection between the use of process improvement and environmental sustainability, which is still ongoing and hence presents a status report.

4.1 Haulier

Haulier is a small freight transport company with most of its operations in Sweden. Around 40 % of the company's operations are for a large logistics service provider, while 60 % are aimed to direct customers. The company has 100 employees, including five administrative employees. Haulier is known in the business sector for its high quality in terms of delivery time and security of the deliveries. The management in this company strives towards reaching high quality standards, good prices and decreasing their negative environmental impact.

Among the efforts the company has done for decreasing their environmental footprint are projects for the optimization of their tyre pressure, the use of alternative fuels, the use of modern vehicles, aerodynamic modifications to their fleet and the use of management approaches.

4.1.1 Process development

Haulier started with the implementation of process management in spring 2017. Prior to the implementation, the company lacked formalised routines, process maps and non-financial documentation. The employees did neither have a structured nor standardized way for doing the different operations needed for the administration of the company. This means that each employee was responsible for his/her own operations and their working routines. Throughout 2017, the research which Haulier was part of, included introductory lectures and workshops about process management. These lectures and workshops were done for the management at the company. Additionally, two employees attended the workshops. These employees were appointed as process owners to the operations in which they were involved. By the end of 2017, Haulier had decided to implement process maps, process teams and process owners into all their operations as a starting point for the process management methodology. Unfortunately, according to the interviewees, due to the need to prioritize their everyday work, the implementation faced challenges that lead to a pause in the development of the process maps, the establishment of the process teams and the assignation of the process owners. The challenges hence related to the time and resources allocation needed for the development of the

teams and process maps. Another challenge pointed out was the mentality of the small company. In their words:

"Being a small company, each of us in the administration do what is needed to achieve the customer requirements, so there is no big need of having process maps".
(Translated from Swedish)

However, the interviewees also mentioned a need for structure and uniformity. The following quote exemplifies this finding.

"There is a need in the company for more structure, communication and uniformity in how we do what the customers require us to do. It is difficult to reach the uniformity when everyone does the tasks in different ways".
(Translated from Swedish)

The need for structure and uniformity is highlighted due to that Haulier have expanded quite fast over the past years and is expected to continue to grow. Currently, Haulier has a preliminary main process map and provisional support, core and management processes which were developed during a previous study with the data from interviews and workshops (Navarro et al., 2018). However, we found that the newly developed process maps have not been used nor communicated to the rest of the personnel. According to the interviewees and the data provided by the management, the process owners have not yet been assigned formally nor have their responsibilities and tasks on the processes been communicated. Haulier still has a lack of routines and the employees are still working in their personal ways.

It was not possible to find operational measurements at Haulier besides the use of on-time delivery rate and on-time quote payments.

Even though process development was not yet completed, the company did efforts of working on the improvements of the processes, based on the preliminary process maps.

4.1.2 Process improvement

For implementing process improvement, the company applied a form for improvement suggestions from the employees and a customer feedback form that the employees with direct customer contact could fill in with input from the customers. Both forms were developed by the researchers based on input from the management and two administrative employees of the company. All the personnel involved in the development of the forms were allocated as process owners for some of the management, core and support processes.

For the incorporation of the improvement suggestions form, the management sent each of the company's drivers a message via their time registry software and posted a reminder in their message board at their headquarters. These messages were intended for the drivers, not the administrative personnel. The messages to the drivers did not include any explanation from management about the process development nor the purpose of the process improvement efforts. During a period of approximately three months, Haulier received three suggestions from the drivers. However, none of the filled-in forms involved improvements to the processes of the company, instead they involved suggestions regarding services for the drivers. It was not possible to implement any of the suggestions in the processes.

The implementation of the employee improvement suggestion form was not communicated in any way to the administrative personnel which made it impossible for them to send any documented improvement suggestions. The interviewed administrative personnel concluded that since the company is small, it is easier to communicate any improvement suggestions directly to the management, verbally. They consider this to be another reason for not receiving any documented suggestions from the administrative personnel during the three months period.

The management does not document any verbal improvement suggestions and changes are usually implemented directly after the suggestion has been made. Once a problem is identified, a solution is developed by the personnel and the management in a reactive way. However, there is a lack of proactive solutions that would avoid the same problems from happening in the future. The solutions to the problems are not actively developed involving different personnel from the company, instead, the manager tends to develop the solution with the specific person who is involved or has communicated the suggestion. This, according to the interviewees, has been an obstacle for developing more creative and effective solutions that avoid negative impact in other operations of the company. The solutions to the problems are not communicated to the rest of the personnel nor are they documented in any way. Additionally, the performed changes are not included in the process maps.

The administrative employees consider the documentation of improvement suggestions as time and effort consuming. However, they state that having the suggestions documented could provide a basis for avoiding recurrent problems. They also consider that including the improvements in the process maps, and using the process maps, could increase the uniformity of their work routines and avoid mistakes and miscommunications that in turn could affect the customers.

For the implementation of the customer feedback form, printed template copies were located at one of the offices. However, according to the employees there was no communication on when and who should fill in the forms. Three of the five administrative employees have direct customer contact, one of them on a regular basis. From the interviews and observations made, the employee with regular direct contact with the customer considered the filling of the form as time consuming and he prioritized everyday operations. Hence Haulier did not fill in any customer feedback forms during the studied period. During the interviews it was found that customer feedback is not usually communicated nor documented. In rare occasions, an electronic message is sent to the administrative personnel when a customer sends a positive feedback. In cases where customer sends negative feedback, the person who receives the feedback is responsible for fixing the issue or refer the customer to a colleague who can provide help for the customer. Albeit, no feedback is documented or further analysed. The changes implemented based on the customer feedback are not included in their processes and are usually handled as reactive solutions instead of proactive solutions.

In the workshop various ways of overcoming the obstacles with introducing an improvement system were discussed between the management and the researchers. One option is to simplify the suggestion form, as the management fear the present form appears as very formal, which might scare some employees from filling it in. Another option would be to get one of the processes in place, including improvement systems, to be able to demonstrate for the other employees how such a system could work for real.

4.1.3 Environmental sustainability and process improvement

At Haulier it was not possible to connect the received suggestions with environmental sustainability. A proactive environmental thinking could not be identified among the suggestions received. During the interviews, it was suggested by the employees that there is a focus on reaching the delivery time and quality targets to achieve customer satisfaction. While the manager of the company initiates and realises several environmental improvements, as well as improvements with positive environmental impact, environmental sustainability and targets were not considered by the employees.

4.2 Forwarder

Forwarder is a cooperative association with approximately 120 haulier members and close to 20 administrative employees. Most of Forwarder's operations are in Sweden including road transport of goods, construction equipment and recycling materials. Among the company's customers, there are multinational companies and small Swedish logistics service providers.

The company's priorities include offering their customers high quality services that are innovative, safe and environmental. These elements are the reason for directing efforts towards increasing their environmental sustainability while striving for customer satisfaction.

Among the efforts the company has done for decreasing their environmental footprint are the use of alternative fuels, modern vehicles in their fleet and the use of management approaches.

In the following segment, we describe the process development at the company, according to the process management methodology.

4.2.1 Process development

Forwarder also started with the implementation of process management in spring 2017. However, prior to the start, the company had some basic process maps and documentation for their policies, goals and work routines. At this company, two employees (the CEO and the Operations Manager) were both aware of the strength of taking a process perspective, and the CEO also had experience from process management from previous management positions with larger logistics companies. All the documentation and the process maps were for ISO certification purposes and were not considered as useful by the employees (Navarro et al., 2018). After a previous study, presented by Navarro et al. (2018), the management at the company decided to implement process management in a proactive way so that the documentation could be part of a living system which would be useful for their employees.
According to the employees, the process development has been slow due to the prioritization of everyday work and challenges in time and resource allocation. In a period of one year, they have established process teams and assigned process owners. The management at the company has been active in introducing process management concepts and principles to the process owners by providing introductory seminars. However, process development is still on a preliminary stage. The original process maps have been changed to new process maps which adapt more to the process management methodology. These new process maps were generated by the authors of this paper based on a series of interviews during a previous study (Navarro et al., 2018). The management decided to hire a consultancy firm with expertise in process management to help them during process development. The consultancy firm will coach them in the development of process maps and documentation of one of the main processes in the company. After coaching, each process owner together with the team will be able to develop and manage their process.

The management has also assigned each of the process owners to determine useful result variables for each of the processes. These indicators will be a way to measure the progress of the process and allow the identification of needs for improvement.

During the interviews, the employees mentioned that they considered documentation, specifically process maps, to be a good guide for the everyday work. They also identify a potential for supporting and training new personnel. It was found that even when the process teams had not yet started with the process maps development or the determination of the indicators, some of the employees evidenced to have process thinking. The process thinking was mostly evidenced in the process owners.

Processes development is not yet completed at Forwarder, but the company made efforts for working on improvement of the processes, based on the preliminary process maps. The results from the process improvement is explained in the following segment.

4.2.2 Process improvement

For implementing process improvements, the company applied a form for improvement suggestions from the employees and a customer feedback form that the employees with direct customer contact could fill with input from the customers. Both forms were developed by the researchers based on input from the management of the company.

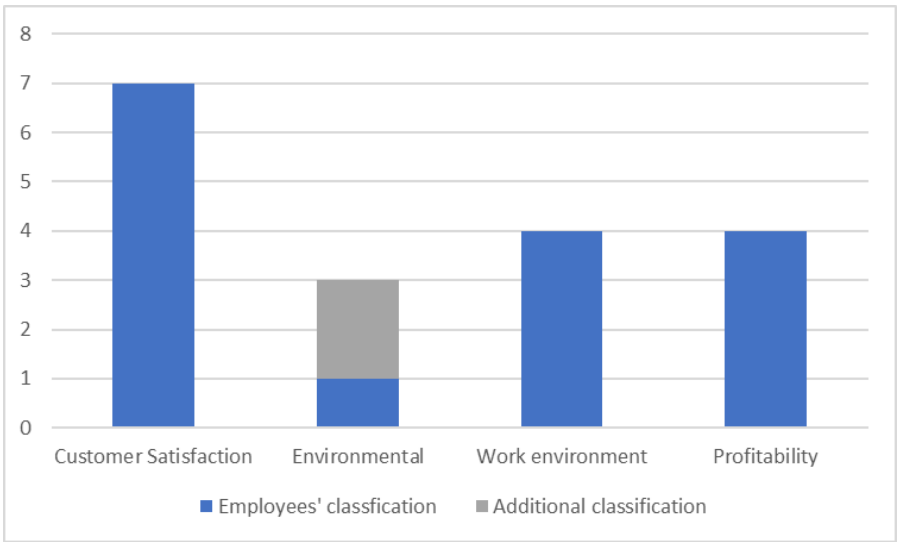
For the incorporation of the improvement suggestions form, the management sent an internal e-mail to all the administrative personnel. In the message, they briefly explained the purpose of the forms and strongly encouraged the employees to send their improvement suggestions. There was no verbal or written further explanations neither for the process development nor for the process improvement.

During the interviews, the employees named some obstacles that they consider could affect the number of improvement suggestions received by the management. The first obstacle was that the employees felt that the management had commanded them to send improvement suggestions. The second obstacle involved a fear to leave 'too simplistic suggestions' without complete improvement suggestions. The third obstacle involved the lack of information on what the suggestions should target and the existence of determined processes. The employees considered that the purpose for sending suggestions was not clear. The fourth obstacle was a sense of a lack of response from the management. The replies from the management to improvement suggestions in a project done years before was not satisfactory for the employees and they considered that the suggestions were not been heard. The fifth and last identified obstacle was the time constraints. The employees considered the forms to be time consuming and they had a need to prioritize the everyday work. They also considered that due to the time constraints most of the improvement suggestions are verbally communicated and existent problems get solved without communicating the solution to the rest of the personnel or including the changes in the processes.

From the managers' perspective there were two additional obstacles. The first one was the difficulty to fill in the forms. They considered that not all personnel would understand the right way of filling in the forms. The second one was that many of the improvement suggestions were raised during the weekly meetings. One of the managers stated that instead of sending personal suggestions, the employees at her department met and identified the areas that needed improvement and developed suggestions which they later documented in the form. Similarly, another manager stated that he collected suggestions from the employees and filled them himself to simplify the task for the employees and making sure that the forms were filled in correctly.

Even with these identified obstacles, the process owners received a total of 10 filled in improvement suggestion forms. They were classified by the employees into four categories according to the potential improvement area. The categories were customer satisfaction, environmental, work environment and profitability improvement suggestions. We later analysed each of the suggestions and reviewed these classifications. Some additional classifications were suggested. Each suggestion could have one or more classifications. The results are shown in Figure 2.

Figure 2. Classification of improvement suggestions at Forwarder



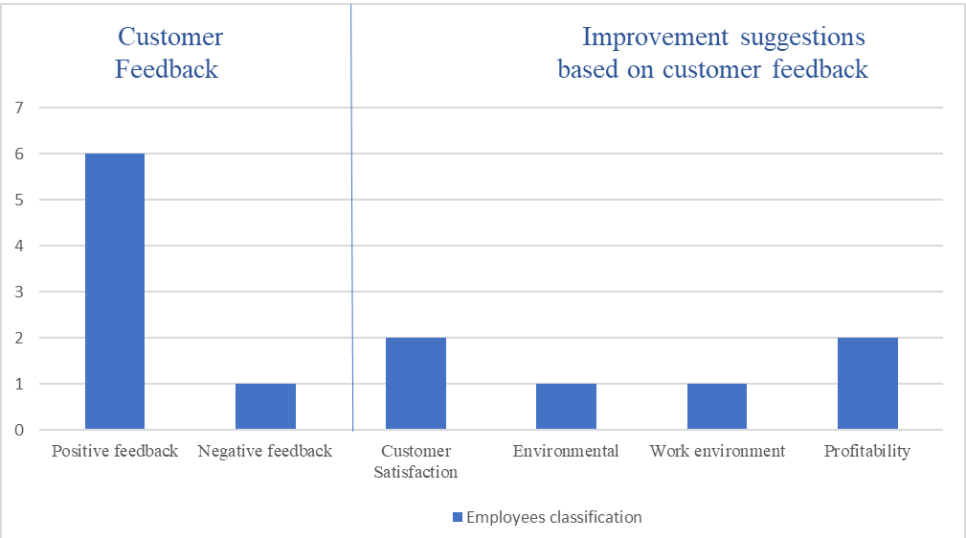
Source: Researchers' elaboration

The customer feedback form was sent to the employees that have direct customer contact. The management communicated to them that the use of the form was for passive and active customer feedback collection. The passive customer feedback collection happens when the customer contacts the company to give them feedback while the active feedback is collected when the personnel contacts the customers and asks for feedback.

From the interviews, the employees identified two obstacles in filling the forms. The first obstacle was the time constraints. Due to their workload, they consider the process of filling a form to be time consuming and not a priority. The second obstacle was the information provided. They considered that having more information about the purpose of the form could give them reasons for prioritizing the documentation. Albeit, the employees mention the importance of documentation for traceability purposes.

Forwarder registered seven customer feedback forms. They were also classified in the four categories according to the area which they could improve, customer satisfaction, environmental, work environment and profitability feedback. In this case, no adjustments were needed since the classifications were accurate. Additionally, the customer feedback was categorised in positive and negative feedback. However, all the feedback categorised as negative was found to be constructive and therefore had the potential to contribute to improvements. The results are shown in Figure 3.

Figure 3. Classification of customer feedback at forwarder



Source: Researchers' elaboration

4.2.3 Environmental sustainability and process improvement

At Forwarder it was possible to make a connection between the received suggestions and customer feedback with environmental sustainability. Nonetheless, the interviewed employees did not mention the environment when asked about the improvement work at the company. Similarly, in the improvement suggestion filled forms, there was only one suggestions classified by the employees as an environmental improvement. Later, the researchers determined that two more suggestions had potential for decreasing the environmental impact (see Figure 2). A proactive environmental thinking could not be identified on most of the suggestions and feedback received.

From the filled customer feedback forms, it was identified that the environmental aspect was present in one of them. This confirms one aspect exposed during the interviews by the employees, the priority for the customers is a high quality of the service and good prices. The employees identified environmental sustainability as a requirement on a lower level in the customer demands. They also state environmental sustainability and environmental targets are not usually considered by customers and therefore, not a priority for the employees.

5. Analysis and discussion

5.1 Progress of the case companies

The cases clearly demonstrate, that the higher level of process implementation in a company, the higher is the level of structured improvements processes. This is in line with Cronemyr and Danielsson (2013).

Top management at both case companies are highly involved in the project. However, with Haulier the initiative rests solely with top management, except for quick fixes. More employees are engaged at Forwarder, but the responsibility is still restricted to a small group. This finding is in line with Evangelista et al. (2017), who describe the low-responsibility for environmental initiatives among employees beyond top management.

The smaller the administration, the higher becomes the need for a body of documentation that is perceived as balanced against its benefits. In particular, the development at Haulier is restricted by this situation. Both Haulier and Forwarder suffer from a lack of resources, where daily work to satisfy immediate customer requirements is prioritised over development work, such as process implementation.

Simplicity is ever attractive and would potentially drive the frequency of improvement suggestions. Both companies expressed, to various degrees and based on various experiences, a fear for the formality of implementing the processes. At the same time, formality is seen in general as something attractive, that would increase transparency and employee commitment and participation. This is an interesting dilemma, where increase formalisation is a paradox. It can be a limitation to development, at the same time as it clearly is an opportunity for development. This finding is similar to those described by Sallnäs and Huge-Brodin (2018).

Simplicity has many sides. Within the case companies we identified a fear among employees of leaving too simplistic suggestions, or not be able to give a suggestion once a problem is identified. This in part reflects an insecurity of how the systems would work. Similar situations demonstrating the fear of losing prestige is described by Allen (1977), Cronemyr (2000) and Mauléon and Cronemyr (2011).

Overall, freight transport companies can be characterised by small profit margins, lack of employees and short-term contracts with customers. This drives a short-term oriented and responsive behaviour. In order to introduce new processes and procedures the need for more management commitment and engagement appears as even more profound among freight transport companies than in many other industries.

5.2 Going from customer satisfaction to societal satisfaction.

The case companies clearly were customer oriented and already had several on-going environmental initiatives when this study started. However, in the beginning of the study, it was noticed that these activities were not structured and documented enough to have sustainable results. So, the motive of the companies for participating in the research project was to achieve that structure by implementing process management. Hence, the awareness and the commitment of the top management in the companies were present already when we started.

Establishing processes went slower for Haulier than for Forwarder, as mentioned above. The employees at Haulier already were customer oriented, as they are a small company and work close to the customers. So, they may not have seen the direct need to establish process management to achieve customer satisfaction. However, the environmental initiatives were solely driven from top management, not by employees. Haulier has not yet received any environmental suggestions from the employees.

Forwarder, on the other hand, is larger and had already worked with process management before (to some extent, for ISO certification). Here the structure of process management was appreciated as a way of formalising and improving activities for increased customer satisfaction. It was also clear that environmental initiatives and measurements were more easily incorporated in the process maps. Furthermore, this led to a more proactive approach to environmental issues, including process operations, improvements, strategic discussions and customer offers. Forwarder has received some environmental suggestions from the employees. Even though most improvement suggestions were about customer satisfaction and/or productivity, some suggestions were about environmental issues. When examining the suggestions, the researchers noticed that some suggestions on increased customer satisfaction

and/or productivity could also have potentials for environmental improvements, which lead to more proactivity at Forwarder.

In conclusion, by following the first two steps of Process Management 1-2-3 (Cronemyr and Danielsson, 2013), Forwarder achieved a structure for customer satisfaction as well as societal satisfaction (i.e. environmental sustainability) while Haulier has not reached that level of structure, yet. Despite these differences, both companies are on the path towards a structured approach to societal satisfaction as suggested by Deleryd and Fundin (2015).

6. Conclusions

In this paper we have explored the possibilities of using improvement systems, based on process management, for increasing environmental initiatives in freight transport companies.

Below we summarise the conclusions to the research questions.

RQ1: How could improvement processes facilitate environmental initiatives in freight transport companies?

Improvement processes could facilitate environmental initiatives in freight transport companies by proving a more structured approach for managing and improving processes within the companies. Having improvement processes embedded in a company's operations can enable the environmental initiatives to be driven by both management and employees.

The use of improvement processes is a proactive approach for gathering improvement suggestions and customer feedback targeting environmental issues in freight transport companies. Forms can be the practical means for collecting the data. These forms require simplicity and process understanding from the employees of the company. Clear communication from the management about the purpose of the improvement systems and its implementation facilitates the use of the forms and the participation of both management and employees.

RQ2: What are the challenges of implementing improvement processes in freight transport companies?

One challenge, that in particular one of the case companies encountered, was that the lack of established processes proved to be an obstacle in the implementation of improvement processes. More established processes paved the way for a more successful improvement system. This confirms, that Process Management 1-2-3 (Cronemyr and Danielsson, 2013) as a method is functioning as predicted, and in line with other contexts where it has been applied.

A second challenge is the top management engagement and commitment vs. the contribution among employees. The situation of environmental initiatives being managed mainly by top management, as described by Evangelista et al. (2017), was confirmed at the case companies. However, our findings indicate that the more established processes, the more initiatives came from the employees and not only the top management.

A third challenge relates to the paradoxical situation of formality. While the implementation of improvement processes is considered as an attractive solution for the business *per se*, the formal demands also bring up some fear among the employees of not following the instructions properly. The essence of this challenge is to identify a suitable level of formalisation well adapted to the particular case, and in addition maintain a dynamic attitude and continue to develop the processes at a pace that is acceptable and realistic.

A fourth challenge is the lack of administrative and financial resources in freight transport companies – it is particularly difficult to find financial as well as practical capacity to invest in processes, even though there is a conviction that such investments will pay off in the long run.
RQ3: What are the potentials of implementing improvement processes in freight transport companies?

The different results from the two case companies indicate that implementing improvement systems, based on process management, can be a path towards a structured proactive approach to improving environmental sustainability in the freight transport business. By utilising well-known tools and techniques of quality management for achieving customer satisfaction, and applying them on a broader scale, we may go towards societal satisfaction, as described by Deleryd and Funding (2015). How far one may reach, still needs to be investigated.

The framework of process management can support the spread of knowledge and initiatives among the employees as well as institutionalise knowledge and skills as a dynamic capability. Thus, it will make companies less vulnerable and more transparent in developing, prioritising and implementing environmental improvements.

Future research

So far, the research has demonstrated that including environmental aspects in processes and in improvement systems is possible and a viable road ahead. Nevertheless, the development is at an early stage, and based on the data we have, it is not possible to distinguish yet whether the improvement system can drive increases in environmental initiatives – we will follow up.

A subsequent study will address the third step of Process Management 1-2-3 (Cronemyr and Danielsson, 2013), which extends environmental sustainability issues into strategic process control.

References

Allen T. (1977): Managing the Flow of Technology: Technology Transfer and the Dissemination of Technological Information within the R&D Organization. Cambridge: MIT Press.

Aronsson H., and Brodin M.H. (2006). "The environmental impact of changing logistics structures*", International Journal of Logistics Management* 17(3): 394 – 415.

Bask A. and Rajahonka M. (2017). "The role of environmental sustainability in the freight transport mode choice", *International Journal of Physical Distribution Logistics Management*, 47(7):560-602.

Bergman B. and Klefsjö B. (2010) Quality from Customer Needs to Customer Satisfaction. Lund: Studentlitteratur.

Brundtland Report (1987) Our Common Future. World Commission on Environment and Development, Oxford University Press, Oxford.

Cronemyr P. (2000) *Towards a Learning Organisation for Product Development*. Licentiate Thesis, Division of Quality Technology and Management, Department of Mechanical Engineering, Linköping University, Linköping, Sweden.

Cronemyr P. (2007). *Six Sigma Management – Action research with some contributions to theories and methods.* PhD diss. Chalmers University of Technology.

Cronemyr P. and Danielsson, M. (2013). "Process Management 1-2-3– A maturity model and diagnostics tool." *Total quality management & business Excellence* 24 (7-8): 933-944.

Deleryd M. and Fundin A. (2015) "The fifth generation of quality concept – from customer to societal satisfaction", presented at, *The World Quality Forum of International Academy for Quality (IAQ)*, Budapest. 2015-10-27

Evangelista P., Colicchia, C. and Creazza, A. (2017). "Is environmental sustainability a strategic priority for logistics service providers?", *Journal of Environmental Management*. 198: 353-362.

Evangelista P., Huge-Brodin M, Isaksson K. and Sweeney E. (2013). "Purchasing Green Transport and Logistics Services: Implications from the Environmental Sustainability Attitude of 3PLs." In Outsourcing Management for Supply Chain Operations and Logistics Services, edited by Folinas, D., 449-465. Hershey: IGI Global.

Gummesson E. (2000). *Qualitative Methods in Management Research*, 2nd ed. Sage Publications, Newbury Park. (1sted. 1991)

Huge-Brodin M. (2012). *The Role of Logistics Service Providers in the Development of Sustainability-Related Innovation*, in Evangelista, P., McKinnon, A., Sweeney, E. & Esposito, E. (Eds.) (2012) Supply Chain Innovation for Competing in Highly Dynamic Markets, Hershey, PA: IGI Global, pp. 2015-223.

Isaksson K. (2014) *Logistics Service Providers going green- A Framework for Developing Green Service Offerings.* PhD Diss. Linköping University.

Johannes E., Ekman P., Huge-Brodin M. and Karlsson, M. (2018). Sustainable Timber Transport – Economic Aspects of Aerodynamic Reconfiguration, in *Sustainability*, 10, 1965.

Juran J.M. (1998). *Juran's Quality Handbook*, fifth edition, McGraw-Hill

Lewin K. (1947). "Group Decisions and Social Change". In: Newcomb, T. M. and Hartley, E. L. (Eds.), Reading in Social Psychology. New York: Henry Holt and Company.

Lockamy A. and McCormack K. (2004) "The development of a supply chain management process maturity model using the concepts of business process orientation", *Supply Chain Management: An International Journal*, 9(4): 272-278

Martinsen U. and Huge-Brodin M. (2014) "Environmental practices as offerings and requirements on the logistics market*", Logistics Research*, 7(1).

McKinnon, A.C. (2015). "Environmental Sustainability: A new priority for logistics managers", in McKinnon, A., M. Browne, A. Whiteing and M. Piecyk. (Eds.) 2015. Green Logistics: Improving the Environmental Sustainability of Logistics. Kogan Page Publishers.

Mauléon C. and Cronemyr P. (2011). "Knowledge Overlapping Seminars: Conversational Arenas Supporting Joint Directed Action in Projects". *Quality Management Journal* 18(3)

Navarro P. and Cronemyr P. (2018). "Applying quality methods for achieving environmental sustainability in the freight transport sector – Reviewing process management and Lean." QMOD conference 2018

Navarro P. Cronemyr P. and Huge-Brodin M. (2018). "Greening Logistics by introducing process management – A viable tool for freight transport companies going green." Accepted for publication in *Supply Chain Forum: An International Journal.*

Paim R., Caulliraux H.M. and Cardoso, R. (2008). "Process management tasks: a conceptual and practical view." *Business Process management Journal* 14(5), 694-723.

Palmberg K. (2009) "Exploring process management: are there any widespread models and definitions?" *The TQM Journal* 21(2), 203-216.

Pålsson H., Winslott Hiselius L., Wandel S., Khan J. and Adell E. (2017) "Longer and heavier road freight vehicles in Sweden: Effects on tonne- and vehicle-kilometres, CO2 and socio-economics", *International Journal of Physical Distribution & Logistics Management*, 47(7): 603-622.

Rogerson S. and Sallnäs U. (2017). Internal coordination to enable high load factor. *International Journal of Logistics Management*, 28(4): 1142-1167.

Sallnäs U. (2016). "Coordination to manage dependencies between logistics service providers and shippers: An environmental perspective." *International Journal of Physical Distribution & Logistics Management* 46(3): 316-340.

Sallnäs U. and Huge-Brodin M. (2018). "De-greening of logistics? Why environmental practices flourish and fade in provider-shipper relationships and networks" (submitted for publication)

Shewhart, W.A. 1931. *Economic control of quality and manufactured product*. Van Nostrand, New York

Shewhart, W.A. 1939. *Statistical method from the viewpoint of quality control*. Graduate School of the Department of Agriculture, Washington D.C.

Wan Ahmad W.N., Rezaei J., Tavasszy L. and de Brito M. (2016). "Commitment to and preparedness for sustainable supply chain management in the oil and gas industry". *Journal in Environmental Management*, 180 (2016): 202-213.

Westlander G. (2006) Researcher Roles in Action Research. pp. 45-61, in: Svensson, L. and Aagaard-Nielsen, K. (2006) *Action and Interactive Research*. Beyond practice and theory. Shaker Publishing BV, Maastricht.

Wolf C. and Seuring S. (2010). "Environmental impacts as buying criteria for third party logistical services" *International Journal of Physical Distribution & Logistics Management 40(1/2), 84-102.*

Yin R.K. (2003). *Case Study Research. Design and Methods*. Thousand Oaks: Sage.