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## Truck Loading Dock Process – Investigating Integration of Sustainability

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# Truck Loading Dock Process – Investigating Integration of Sustainability

Niels Hackius and Wolfgang Kersten

## Abstract

Truck loading docks as a bottleneck and a logistics interface notoriously plagued with misunderstandings and scheduling issues recently came to the attention of research in the wake of the 2011 report of the German federal office for goods transport. At the truck loading dock the different objectives of road haulers and warehouse operators collide having implications for the whole supply chain. This study aims to verify problems identified in earlier studies with a special focus on SME and explore the question how practitioners would include sustainability measures in that process.

A qualitative interview method was used for the investigation, including various players from the logistics industry. A focus group discussion as well as nine face-to-face semi-structured interviews were used to gather optimization and sustainability integration suggestions for the loading dock processes.

An increased need for information, a primary focus on efficiency as a method to become more sustainable, especially ecological sustainability as well as a lack of consideration of social issues were found.

The research is limited due to the small sample that naturally cannot take all perspectives into account. The perspective of truck drivers is not included.

Practitioners are to gather new ideas for the sustainability concepts as well as optimization methods for the loading dock processes in their enterprises; a long term outcome of this research project will be a best-practice catalogue.

**Keywords:** transport, loading docks, logistic interfaces, sustainable process improvements

## 1. Introduction

Truck loading docks have been identified as a major bottleneck in distribution and procurement logistics (Bundesamt für Güterverkehr, 2011). This links together two actors of the supply chain: freight forwarders or logistics service providers on one side and road haulers on the other. In a study, following up the 2011 report of the German federal office for goods transport, Hagenlocher, Wilting and Wittenbrink (2013) identified a multitude of issues regarding dock processes; these findings not only outlined implications on the flow of goods and underlying ecological and social concerns. In further scientific literature Borgström, Hertz and Jensen (2014) point out the immense cost pressure road haulers are facing in their business and outline the consequences for sustainable supply chain approaches. Additionally, publications from the German logistics industry suggests that even brief delays or traffic congestion can invalidate drivers' schedules for the complete tour (Bergrath, 2011; Lauenroth, 2012; Semmann, 2012).

Logistics service providers take the weaker role in this process; due to standardization their services are exchangeable and face immense competition. Consequently it is expected that the efficiency losses are accommodated by them. Additionally these companies are increasingly facing the demand of their customers and the general public to review their processes with respect to ecological impacts and social issues (Lieb and Lieb, 2010).

In the light of sustainable supply chain management being considered to still be at an early stage of implementation, it seems consequent to take a look how these goals can be incorporated into management concepts for the loading dock (Brockhaus, Kersten and Knemeyer, 2013). In the context of a larger federal funded project small and medium sized enterprises (SME) and their current approach to managing truck loading docks, sustainability and combining both were investigated.

## **2. Method**

This publication is embedded in to a larger research project with the ultimate aim to present a best practice protocol for loading dock management with sustainability aspects in mind. Hence, qualitative research methods were chosen as it was vital to gain a deep understanding of problems and processes in SME with respect to including sustainability.

After conducting an initial literature review the problem was chosen to be investigated via a two stage design derived from Blumberg, Cooper and Schindler (2008, p. 207). In a first step a focus group workshop was carried out in order to outline the major dimensions and questions for SME. Semi-structured interviews as a second step were employed to generate new hypothesis and validate points made when working with the group (Charmez, 2008; Punch, 2013).

### **2.1 Focus group**

This method allows for a guided discussion about various aspects of the problem and allows for an initial insight while maintaining a broad approach to the problem (Blumberg, Cooper and Schindler, 2008). The problems found during the workshop represent a list of current problems that SME face during the truck loading process. They were classified according to sustainability criteria. Companies and entities with practical knowledge of sustainability in logistics and/or truck loading docks were invited to attend the session in-house. Nine companies with different roles in the logistics sector, one person from a public authority and three persons from academia participated; the full listing can be found in table 1.

The participants were introduced to the project and to the triple bottom line definition of sustainability according to Carter and Rogers (2008). Subsequently the attendees were requested to write down problems on index cards that they found to be a major or to a daily disturbance regarding loading docks. The system boundary was defined as that part of the process which actually

involves the arrival on site as well as the process prior to arrival when the loaded truck was en route to the destination. The number of cards was not limited. In a second step each card was presented and the attendees were asked to either assign it to a category or to discard it as a duplicate. According to Carter and Rogers (2008) triple bottom line model categories were presented: economic issue, ecologic issue or social issue; each problem could be assigned to one, two or all of the categories, effectively yielding seven possible categories. As a concluding step participants were allowed to allot a total of three weighing points to any of the cards; cumulation was allowed. They were asked to do this as quickly as possible and according to their personal experience without discussing with each other.

The described problems, their assigned dimension as well as the cumulated rating of the group were then recorded. The discussed issues were also used to create the interview guideline and as one subset of interview labels.

## **2.2 Interviews**

After concluding the first stage of the investigation, semi-structured interviews were conducted. It was intended to gain a deep understanding of the management process at loading docks, how these companies define sustainability and how this might integrate in their truck loading process at the docks.

Industry representatives were recruited in part from the focus group and directly invited at trade shows or conferences. Interviewees were chosen such that they were from different professions in the logistics sector. Before the interview they were presented with a questionnaire which allowed them to prepare their answers in part. Nine companies (as shown in table 1) from different parts of the logistics industry were recruited for audio recorded interviews. Most (7/9) of them were interviewed on site, so that it was possible to take a live look at the discussed processes. In a few cases (2/9) more than one person took part in the interview; this is indicated by a slash in the column "Position of Interviewees" of table 2.

Company type	SME	Number of participants from that type
Freight forwarder	No	2
Warehousing	Yes	2
Warehousing	No	1
Consulting	Yes	1
IT services for logistics	Yes	2
Public Authorities	n/a	1
Logistics services	Yes	1
Academia	n/a	3

Tab. 1: Focus Group

Three groups of questions were discussed (see table 3). After a short introduction of the company's services, the representatives were asked to describe the whole process of loading and unloading trucks at the docks and elaborate on possible optimization methods for this process. In a second step they explained their definition and understanding of sustainability and described its current implementation in their company. In the third part of the question set a brief explanation of the triple bottom line was presented: Interviewees were explained that there are multiple facets to sustainability and asked how they

would conceptually integrate these thoughts in their loading processes. In the same vein participants were asked which drivers would be necessary to make them increase their sustainability efforts.

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Company#	Company type	SME	Position of Interviewees
1	Production of food	No	Dispatching
2	Commerce	No	Head of Logistics / Logistics
3	Cooperation for bulky goods	Yes	CEO/Warehouse Manager/Quality Manager
4	Warehousing	Yes	CEO
5	Consulting	Yes	CEO
6	Consulting	Yes	CEO
7	Commerce	Yes	Warehouse Manager Incoming Goods / Warehouse Manager Outgoing Goods
8	Freight Forwarder	Yes	CEO
9	Logistics support services	Yes	Head of distribution and purchasing

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Tab. 2: Interview participants

Audio recordings of the interviews were then analyzed. In a first step descriptive labels were used to start the analysis (Punch, 2013). As Punch (2013) stresses comparison is especially important in qualitative inquires, thus the descriptive labels were tested against all interviews in a second step. As a third step a table was compiled: It contains the labels as list of statements as well as the number of interviewees agreeing, disagreeing or no recorded response. Additionally the labels were grouped for context.

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Group	Question
Loading and Unloading	What does your process for loading and unloading look like?
	In current loading and unloading processes you take part in: Which optimization possibilities would you identify
Sustainability	What is your understanding of sustainability?
	How do you implement sustainability in your day-to-day business?
Integration of sustainability in the loading and unloading process	How would you integrate sustainability concepts in the loading process conceptually?
	Which reasons would drive you to extend your sustainability concept?

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Tab. 3: Interview outline



### **3. Results**

#### **3.1 Focus group discussion**

During the focus group discussion 23 problems were generated; all of them are numbered and listed in table 4. Additionally, in the column "Sustainability dimension chosen" of the table the sustainability dimension assigned by the group is listed. The "importance rating of the problem" was generated by counting the points allotted to each problem in total.

No problems were allocated solely belonging to the ecological or to both ecological-social dimension. Most of the problems were allocated either belong to all dimensions equally (9/23) or to both, the economic and social dimension (8/23). Only one problem was assigned to the social dimension alone. The other problems were assigned to the economic dimension (4/23) or were said to include both economic and ecological aspects (2/23).

Availability of information (7/36 points) was identified to be the most important problem, the group outlined it as negatively influencing all sustainability dimensions. In the discussion surrounding this item some participants also voiced their concerns about making more information available to outsiders and also explained that there were severe doubts whether the investment in necessary information technology would justify the benefits.

Furthermore, it was discussed in the group that inefficiencies at truck loading docks may cause direct problems for the truck drivers, e.g. as they hamper their time schedules. This lone problem (5/35 points) in the social sustainability dimension was reported as being the second most important one. It was important to the group to note that warehouse operators were not generally interested in creating a negative environment for the in-house personnel nor the incoming drivers.

The third rank (each 4/36 points) is a tripartite of the cooperation with loading dock operators as well as third and fourth party logistics service providers, time slot management systems and opening hours of loading docks. When cooperating with logistics service providers some members which operated

warehouses elaborated that they have found it difficult to communicate the specific on-site needs to the actual sub-contractors that haul the cargo. Obviously knowledge of the actual opening hours and assigned time slots were part of these problems, but during the workshop it was also claimed that inflexibility introduced by these constrains would cause road haulers to intentionally miss time slots or having to plan inefficient routes.

#	Sustainability dimension chosen	Problem	Importance rating of the problem
-	Ecological	None	-
Social			
1	Social	Truck Drivers	5
Economic			
2		Loading and Unloading times	4
3		Number of Loading Docks available	2
4		Waiting times are a cost driver	1
5		Cost allocation is difficult	0
Ecological and Economic			
6		Cooperation with loading dock operators as well as third and fourth party logistics service providers	4
7		Documentation is still done on paper	0
Ecological and Social			None

#	Sustainability dimension chosen	Problem	Importance rating of the problem
Economic and Social			
8		Opening hours of the unloading point are too short	4
9		Whose responsibility is it to unload?	1
10		Language barrier	1
11		Extended Working hours	1
12		Drivers are missing information	0
13		Self-collectors don't pick up their goods	0
14		Waiting times and times spent at the docks is too long	0
Ecological and Social and Economic			
15		Flow of information	7
16		Processes are not transparent	3
17		Waiting areas for trucks are limited	1
18		Police Checks	1
19		Opening hours of all the loading and unloading points are inconsistent	1

#	Sustainability dimension chosen	Problem	Importance rating of the problem
Ecological and Social and Economic			
20		Systems used by the different participants are not compatible	0
21		Complexity of the whole supply chain has to be regulated at the loading dock	0
22		Warehouses do not provide enough storage	0
23		External impacts (weather, traffic jams)	0

Tab. 4: Problems identified with the focus group

### 3.2 Interviews

The results of the interviews were aggregated as descriptive labels into three groups: “Loading and Unloading: Overall Process” (see table 5), “Sustainability” (see table 6) and “Optimization possibilities” (see table 7). An additional group was used for cross-checking the workshop statements (see table 8). Labels in the first two groups were only included if majorities of the interviewed companies (>5) made a statement about them; all optimization possibilities were included to allow an insight to new ideas. Ideas for integrating sustainability and truck loading docks were aggregated and are listed in table 9.

### 3.2.1 Loading and Unloading

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#	Statement	Agree/Disagree/ Not Applicable
1	A time slot management system for the loading docks is used.	7/1/1
2	The trucks do not always arrive as expected.	7/1/1
3	There are partners the company regularly works with.	6/1/2
4	There are peak times where many trucks arrive at once.	5/2/2
5	Trucks that do not arrive on time are unloaded nevertheless	5/2/2

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Tab. 5: Loading and Unloading: Overall Process

It was found that most companies describe a similar process in loading and unloading: Initially the drivers sign up with the service personnel, after a certain time they are assigned to a certain dock for loading and subsequently sign out with dock service staff. Major differences were observed in this process regarding the wait and arrival times. Additionally, some minor differences in the processes were observed, but not systematically recorded. These included additional loading points for euro-pallets and staff that was specialized in handling only incoming or only outgoing trucks as well as additional security personnel.

Almost all companies agreed that they either employ a time slot management system themselves or are confronted with it. One company declined indicating that they had not found a software fitting their needs, but noted that they were looking into developing their own solution. Not applicable was noted for one interview with a company that used different solutions across independent warehouses and thus couldn't make a definitive statement. What can be noted about time slot management is specifically that the sophistication of these systems varied greatly: While some companies use a simple calendar receiving only the most important shipping notifications over the phone, others use spreadsheets and daily email notifications and a few use sophisticated web based solutions. The initial reasons for deploying these solutions vary, but during all interviews the participants stated clearly that the docks and the operating staff are limited resources.

A main problem identified during the interviews was that the trucks would not always arrive as expected. This very general label however does not fully extend the problem; during some interviews delays of days or more than two hours were reported. One company stated that some trucks would arrive a lot earlier betting on the chance that they would be processed earlier than the time slot they got initially. One other company however explicitly underlined that in today's competition road haulers could not afford to be late and claimed that trucks of his company would never be late.

The same range can be seen in statement 5 in table 5: Typically the late comers are unloaded. However, this is to be taken with a grain of salt, while two of the interviewed companies reject this thesis, three of the five that agree caution that it is done on a best effort basis.

This is mostly related to the problem that companies also report certain peak times during the day which are requested most often by the haulers or which have the most incoming haulers. Some of the dock operators note that they have a varying number of docks available during the day and some note that this is the reason for deploying a time slot management system. One observation seems worth noting: Two companies that stated they would not

take trucks which are not on time, also experience peak hours and do not use a sophisticated time slot management system.

On the other hand six of the companies state that they have certain partners they regularly work with. These cooperation take very different forms. One company reported a contract collaboration which is very close to a general-cargo-alliance. Other collaboration forms are much simpler and use the knowledge of the drivers and simple negotiations over the phone as inputs with different time horizons. Rejection of this thought (one company) exposed a problem Hagenlocher, Wiltling and Wittenbrink (2013) also reported: The carrier is chosen often chosen by the other side, hence, not known or tracked by the receiving enterprise.

### 3.2.2 Sustainability

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#	Statement	Agree/Disagree/ Not Applicable
1	Sustainability has economic, ecologic and social aspects	5/2/2
2	Ecology is only achieved through efficiency	4/3/2
3	The economic aspect is the most important one when making decisions concerning sustainability.	5/1/3
4	Sustainability is integrated into day-to-day company processes.	6/1/2

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Tab. 6: Sustainability

Sustainability including social and ecologic as well as economic aspects was often quite well understood in the companies asked (statement 1 table 6). Initially intended to see to which extend a triple bottom line or sustainable supply chain management model was implemented, only two of the firms asked stated that it was in their interest to achieve economic, social and ecologic goals all at once. The two not included in the group agreeing didn't think social issues were part of a sustainability strategy. Statement 2 and 3 in table 6 highlight this connotation. Only few companies asked reject that notion; one of the interviewees stated that in the future it was probable that additional kilometers would be restricted and critically noted that transporting goods across the country only for small subsequent process steps was an unnecessary luxury.

Most of the companies thought that sustainability was integrated in their company processes (statement 4 in table 6). However, taking statements 2 and 3 into account this cannot be understood as a progressive position, most of them simply stated that they achieve sustainability through increased efficiency.

### **3.2.3 Optimization possibilities**

When discussing optimization possibilities concerning the current processes a mix of suggestions was found, all of them are shown in table 7. Two issues (statement 3 and 4) were predominant, however, their underlying cause can be summarized as one: Need for information. Companies that agreed that an improved quality of information about truck arrival times would help them to plan load sequences or preparation of cargo pick-up or intake. The idea of this quality was ranged, essentially, however interviewees articulated that it would help them to get a notification of dispatch at all and if the actual time would be confirmed in a certain time range before the actual arrival. Three companies proposed that a confirmation two hours ahead of the arrival would give them a lot more flexibility. For less than full truck loads two of the interview partners suggested to include information about the load sequence with these confirmation (statement 4, table 7). One party disagreed with both of these



optimization ideas specifically, because they felt that their time slot management sufficiently accounted for this problem. Accordingly, two companies noted that they would welcome standardized freight information in order to avoid confusion and speed up internal processes (statement 2 table 7). More than once quality and key performance indicators were discussed, whilst some companies elaborated that they do check for certain quality features already they also noted that these quality checks are not recorded. Hence, the “black sheep” among road haulers could be denied pick-up or delivery of goods in the future (statement 6, table 7). Two companies noted that they are in the process of introducing certain key performance indicators for their loading processes. However, they were to include an ecological footprint as well (statement 7, table 7). Penalties based on these KPIs were suggested by two parties: One of them had integrated certain soft, not contract based penalties for their logistics service providers, but didn’t have any implemented on the warehouse side (statements 8 and 9, table 7).

Moreover, two companies noted that they optimized their process by handing out leaflets about the on-site processes in order to address the language barrier problems. One other rejected the notion of any multi-language information, because they would never be able to address all drivers (statement 1, table 7). Two additional, partially implemented suggestions, were made: One being to reorganize the stream of incoming good such that the warehouse takes control over the whole flow. This idea however is strategic and has certain constrains with respect to the parties the warehouse works with; one interviewed company clearly rejected that idea noting that the producers are fully responsible to deliver the goods to their door (statement 10, table 7). The other, fully implemented suggestion was to establish a safety procedure: In this case the company required wheel chocks to be placed and the truck having come to a complete stop before the loading dock door could be opened (statement 11, table 7).

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#	Statement	Agree/Disagree/ Not Applicable
1	Directions for the on-site process are available in multiple languages.	2/1/6
2	Freight information for trucks should be standardized	2/0/7
3	Information: More detailed information about the cargo (type, loading sequence)	4/1/4
4	Information: Truck arrival times should be known in more detail.	5/1/3
5	Information (e.g. leaflets) about parking spaces in the area is available.	1/0/8
6	Job specific quality indicators are recorded	3/0/6
7	Key Performance Indicators are recorded	2/0/7
8	Penalties for logistics service providers are defined.	2/0/7
9	Penalties for warehouse operators are defined	1/0/8
10	The merchandise is brought in on request of the warehouse (pull from the factory, warehouse has control over own incoming stream)	2/1/6
11	There is a safety procedure for the loading dock.	1/0/8

Tab. 7: Optimization possibilities

### 3.2.4 Focus group discussion revisited

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#	Statement	Agree/Disagree/ Not Applicable
1	Information: Communication between road haulers and logistics service providers is insufficient	4/2/3
2	It is difficult to meet the assigned time slots.	1/3/5
3	The opening hours of the different loading bays are too heterogeneous.	4/0/5
4	There is a language barrier which causes problems.	5/0/4
5	Who loads or unloads: Do truck drivers load the cargo themselves?	4/2/3

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Tab. 8: Cross-checked statements from the focus group workshop

For the cross checked statements that have enough responses it was found that the interviewed partners mainly agreed with the statements gathered from the focus group workshop. The language barrier was viewed as a definitive problem. In the personal interviews some partners extended to explain that it caused road haulers to miss information on required loading tackles, time slots or other local information (statement 4, table 8).

As noted in section 3.2.3 availability of information is a problem, however not all interviewed parties quite agreed that it was a problem in practice. Two companies rejected the thesis that communication was insufficient; rather saying that they "...assume that if a 40 ton delivery is late that their agent will call ahead..."

As discussed in the focus group part of the interviewees agreed that the heterogeneity of the opening hours posed a problem (statement 3, table 8). At one of the companies that opened during the night time it was possible to observe drivers that simply had assumed that the loading bays would be closed before 6:00 am.

In terms of responsibilities concerning unloading the positions differed, but had the common denominator that it was usually agreed upon by contracts (statement 5, table 8). This is a large deviation from observations made in industry literature (Bergrath, 2011; Bundesamt für Güterverkehr, 2011). However, warehouse operators also explained that often times employed subcontractors were not informed of these agreements or did not understand them (see statement 4 and 5, table 8).

### **3.2.5 Integration of sustainability in the process**

The answers and suggestions how the loading process could be made more sustainable were separated in four groups. Most attention was given to changes that involved the use of technology or improvement of the overall process.

As already seen in the interview data participants strived for an increased automation and use of up to date smartphone technology. The general idea here was to increase efficiency and thus reduce the ecological footprint and times the road haulers have to spend on site.

All participants also hoped for improved processes in the future; whilst on the one hand a closer collaboration with the suppliers, the exactness of the actual arrival times was also thought be improvable through required ahead notifications and reducing load times in general. The idea here is basically the same as for the technology suggestions, however, an improved collaboration with the suppliers would also allow road haulers to improve their routes through negotiating with them. On the other hand suggestions concerning the process also called for increased flexibility not only during the operative process, but also by extending opening hours. The rationale, according to the interviewees

is that a greater variety of time slots would allow the haulers to plan their routes in a way more efficient for them.

In terms of suggestions concerning the social perspective sustainability more than one of the persons interviewed suggested that they try to create a more comfortable atmosphere for the drivers while waiting by providing coffee. One company said that they will try to incorporate the required breaks of the truckers in their dock assignment scheme.

A few participants also made suggestions regarding the strategy for planning new warehouses or improving existing ones: Choosing the location of the warehouse in such a way that it would take concerns of external stakeholders (e.g. surrounding residential areas) as well as pick-up and delivery processes into account. Companies also suggested to streamline the process overall, but just as combination of deliveries this, according to them, often requires close collaboration with the suppliers and is not often feasible.

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How would you integrate sustainability into the process of loading and unloading?

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### Technology

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Automation

Digitalization

Improving communication

Time slot management software to reduce time of trucks on site

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### Process

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Closer collaboration with the suppliers

Delivery of stocks during the night time.

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How would you integrate sustainability into the process of loading and unloading?

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Process (continued)

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Increased flexibility concerning dock usage and arrival times at the warehouse.

Reducing loading dock contact times

Requiring drivers to notify the warehouse 2 hours prior to arrival

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Social improvements

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Providing a coffee vending machine

Matching of work breaks of the drivers with the loading time slot.

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Strategy

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Streamline the processes

Reduction of empty space by combining deliveries.

Warehouse location chosen strategically

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Tab. 9: Integration of Sustainability – Suggestions by interviewees

## **4. Discussion**

In terms of discussed problems the results are very much in line with previous findings from scientific and German industry literature. It can be confirmed that sustainability mainly requires economic drivers to be implemented as found by Brockhaus, Kersten and Knemeyer (2013).

Three major groups of problems were identified taking both the focus group and the face-to-face interviews into account: Availability of information, efficiency versus sustainability and problems handling social sustainability issues. Problems described in these groups are similar to the ones described in literature, but taking the recorded suggestions into account it is possible to gain an insight into possible solutions.

### **4.1 Availability of information**

In both the focus group discussion (see 3.1) and the interviews (see 3.2) one of the major problems and the main optimization potentials identified by the participants was availability of information to improve the warehouse side process. The overall claim was that knowledge of the vehicles current position would allow to streamline the handling of the trucks. In the long run, so the belief, this efficiency gain would allow for economic, ecologic and social benefits. Yet on the other hand it was doubted that the potential investments for IT would be beneficial enough.

While Hazen and Byrd (2012) concluded that overall logistics companies profit from information technology, they also note that these savings are implied by more efficient processes. In this specific process, however, losses on the warehouse operator side are not to be expected; they typically have to be accommodated by the road haulers. Hagenlocher, Wilting and Wittenbrink (2013) note these costs for the different time slot management systems, as one example of information technology use, as a possible drawback. Especially because some of these systems pass the costs on to the user, requiring payment for each booking.

Literature and interviewees suggest that a broader exchange of information and improved communication processes could help to increase the degree of use of the docks as well as shorten passage times (Durmahn, 2012; Hazen and Byrd, 2012). Whether this is feasible for SME and if road haulers and suppliers also benefit from this change remains elusive.

## **4.2 Efficiency versus sustainability**

Sustainability efforts should be driven by increasing economic values – this statement seemed to be the consensus among the interviewees, denied by only one party that has sustainability efforts deeply rooted in their company values. While know from Carter and Rogers (2008) stated that a proper application of sustainable supply chain (SSCM) principles can in fact decrease cost and improve processes it seems short sighted to claim that a sole increase in efficiency in the process can improve sustainability. Especially in the discussion of social issues it seems to be the hope that by shorter contact times sustainability issues will simply move out of scope for warehouse operators.

Naturally, operators of warehouses optimize their processes towards their best performance. However, ideal processes inside the warehouse are continuous and linear. Hence, a system is needed to streamline the non-linear stream of incoming trucks. Unsurprisingly this happens by limitation of resources and is only slightly mitigated by using a management system that administers these resources.

True optimization would require a more dynamic availability of resources or long term planning. Both can be achieved through closer collaboration while planning the dock loading process. This is also reflected in the optimization suggestions gathered. Borgström, Hertz and Jensen (2014) observe that close cooperation is often avoided at the expense of sustainability. The reasons for avoiding these collaborations need to be further investigated.



Furthermore, it should be inspected how electronic systems and manual planning routines could be enhanced such that they provide an interface for collaboration between the drivers on the road and the destination. If this communication was enforced both ends could benefit from the updated information.

### **4.3 Social Issues**

Hagenlocher, Wilting and Wittenbrink (2013, pp.45–54) and multiple sources from German industry and the German government claim that access to common rooms for recreation as well as sanitary facilities is limited or non-existent (Gießel and Voigt, 2012; Durmann, 2012). Besides these basic necessities, unplanned delays at the loading bays also cause follow-up problems for the truck drivers, because it becomes difficult to meet the schedule for the next stops. Breaks that are required by law might end up not being taken (Bundesamt für Güterverkehr, 2011).

In the results of the face-to-face and group discussion it can be seen that aspects concerning social dimensions and pressure exerted on the drivers is not part of the warehouse operators concern. In turn road haulers not only have to face the economic losses, but especially the reputation of the work of the drivers suffers – making it harder to attract good drivers (Borgström, Hertz and Jensen, 2014).

### **4.4 Limitations**

This study is limited to nine companies yielding thirteen interview partners from different professions of the logistics sector and thus provides a very limited view into this process. Especially because road hauler companies were not available for an interview. Moreover international literature on this topic is very limited. The findings as well as studies by Hagenlocher, Wilting and Wittenbrink (2013) and Borgström, Hertz and Jensen (2014) on the other hand show how difficult it is to expand corporate social responsibilities programs down to this level, hence a more intensive study is necessary.

## **5. Conclusion**

Truck loading docks efficiency and sustainability directly influence the performance of warehouse operators and road haulers. The implications of unplanned delay are known to all participants. The companies are aware of sustainability concepts and the prospect of customers demanding a triple bottom line or sustainable supply chain model across the whole supply chain. Economic and respectively efficiency as the main drivers for this specific interface do not fully satisfy a sustainable approach. A best practice concept for loading dock procedures is not known. Operators of loading docks must think outside their company in order to generate new concepts; it will not be enough to optimize the inside process.

Future approaches should enforce closer cooperation between the trucks on the road and their destination. This can happen through automated systems using recent digital technology. The available information and required exchange of information will help the companies participating in the supply chain to adjust. Changes not only for profit, but also for optimizing plans regarding environmental aspects, for example by choosing different routes.

Regarding social sustainability, especially as a part of corporate social responsibility efforts and in terms of job attractiveness, freight forwards as well as road hauling companies, increasingly will have to include the needs of the drivers in their concepts in a way that goes beyond acknowledging it.

## 6. Further Research

In a next step it is intended to derive a management approach and best practice catalogue on how to implement loading docks such that the needs of different stakeholders are accounted for. In the light of the imbalanced power, future investigations should take a look at possible collaboration models for these kind of relationships, investigating which key performance indicators companies could use and which incentives each site can offer in order to gain a competitive advantage.

## Disclosure

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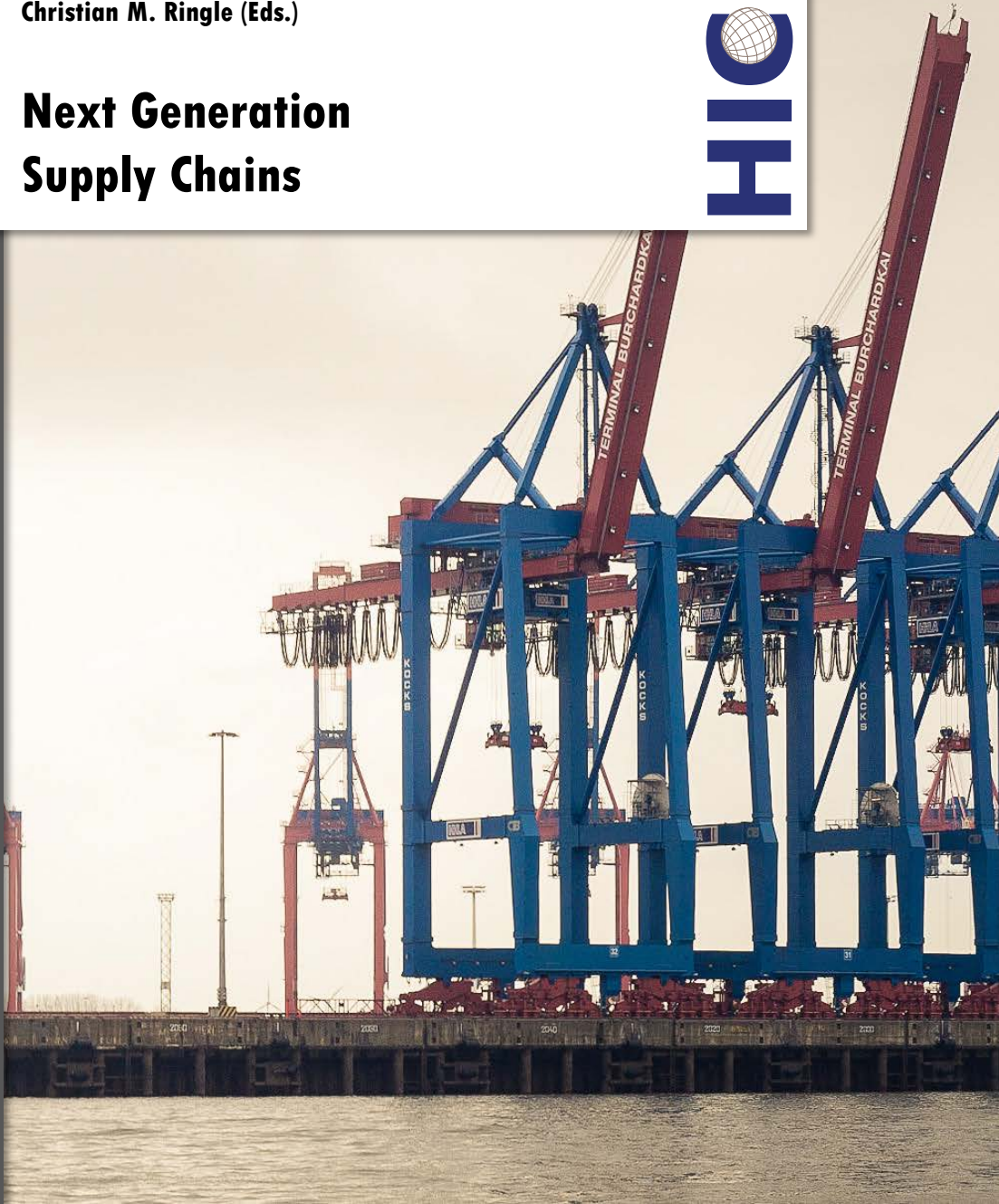
An extended abstract of this project has been published at the 26th Conference of the Nordic Logistics Research Network 2014 in Copenhagen.

## References

- Bergrath, J., 2011. Handelsembargo. Fernfahrer, pp.6–8.
- Blumberg, B., Cooper, D.R. and Schindler, P.S., 2008. Business Research Methods. 2nd revise ed. London: McGraw-Hill Higher Education, p.206.
- Borgström, B., Hertz, S. and Jensen, L.-M., 2014. Road haulier competition - implications for supply chain integration. In: B. Gammelgaard, G. Prockl, A. Kinra, J. Aastrup, P.H. Andreasen, H. Schramm, J. Hsuan, M. Malouf and S. Finke, eds., Competitiveness through Supply Chain Management and Global Logistics. København: Copenhagen Business School, pp.663–679.
- Brockhaus, S., Kersten, W. and Knemeyer, A.M., 2013. Where Do We Go From Here? Progressing Sustainability Implementation Efforts Across Supply Chains. Journal of Business Logistics, 34(2), pp.167–182.
- Bundesamt für Güterverkehr, 2011. Sonderbericht zur Situation an der Laderampe. Köln.
- Carter, C.R. and Rogers, D.S., 2008. A framework of sustainable supply chain management: moving toward new theory. International Journal of Physical Distribution & Logistics Management, 38(5), pp.360–387.
- Charmez, K., 2008. Constructing grounded theory. London: Sage Publ Inc.
- Durmann, C., 2012. Rampenproblematik: Und sie bewegt sich doch! Süddeutscher Verkehrskurier. Nov.
- Gieße, A. and Voigt, S., 2012. Nadelöhr Laderampe. Verkehrs Rundschau, Dec., pp.20–26.
- Hagenlocher, S., Wilting, F. and Wittenbrink, P., 2013. Schnittstelle Rampe – Lösungen zur Vermeidung von Wartezeiten (Schlussarbeit). Karlsruhe.
- Hazen, B.T. and Byrd, T.A., 2012. Toward creating competitive advantage with logistics information technology. International Journal of Physical Distribution & Logistics Management, 42(1), pp.8–35.
- Lauenroth, L., 2012. An der Rampe läuft es häufig nicht rund. DVZ, p.2012.
- Lieb, K.J. and Lieb, R.C., 2010. Environmental sustainability in the third-party logistics (3PL) industry. International Journal of Physical Distribution & Logistics Management, 40(7), pp.524–533.
- Punch, K.F., 2013. Introduction to Social Research: Quantitative and Qualitative Approaches.
- Semmann, C., 2012. Eiszeit an der Rampe. DVZ, Feb., pp.1–2.

**Wolfgang Kersten, Thorsten Blecker and  
Christian M. Ringle (Eds.)**

# **Next Generation Supply Chains**



Prof. Dr. Dr. h. c. Wolfgang Kersten  
Prof. Dr. Thorsten Blecker  
Prof. Dr. Christian M. Ringle  
*(Editors)*

# **Next Generation Supply Chains**

Trends and Opportunities

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## Preface

Today's business environment is undergoing significant changes. Demand patterns constantly claim for greener products from more sustainable supply chains. Handling these customer needs, embedded in a sophisticated and complex supply chain environment, are putting the players under a constant pressure: Ecological and social issues arise additionally to challenges like technology management and efficiency enhancement. Concurrently each of these holds incredible opportunities to separate from competitors, yet also increases chain complexity and risks.

This book addresses the hot spots of discussion for future supply chain solutions. It contains manuscripts by international authors providing comprehensive insights into topics like sustainability, supply chain risk management and provides future outlooks to the field of supply chain management. All manuscripts contribute to theory development and verification in their respective area of research.

We would like to thank the authors for their excellent contributions, which advance the logistics research progress. Without their support and hard work, the creation of this volume would not have been possible. We would also like to thank Sara Kheiravar, Tabea Tressin, Matthias Ehni and Niels Hackius for their efforts to prepare, structure and finalize this book.

Hamburg, August 2014

Prof. Dr. Dr. h. c. Wolfgang Kersten  
Prof. Dr. Thorsten Blecker  
Prof. Dr. Christian Ringle



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## **About HICL**

Since 2006 the annual conference Hamburg International Conference of Logistics (HICL) at Hamburg University of Technology (TUHH) is dedicated to facilitate the exchange of ideas and contribute to the improved understanding and practice of Logistics and SCM. HICL creates a creative environment which attracts researchers, practitioners, and industry thinkers from all around the world.



Innovation is increasingly considered as an enabler of business competitive advantage. More and more organizations focus on satisfying their consumer's demand of innovative and qualitative products and services by applying both technology-supported and non technology-supported innovative methods in their supply chain practices. Due to its very characteristic i.e. novelty, innovation is double-edged sword; capturing value from innovative methods in supply chain practices has been one of the important topics among practitioners as well as researchers of the field.

This volume, edited by Thorsten Blecker, Wolfgang Kersten and Christian Ringle, provides valuable insights into:

- Innovative and technology-based solutions
- Supply chain security management
- Cooperation and performance practices in supply chain management

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