The role of emission data sharing for decarbonising road freight transport


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International Workshop on Sustainable Road Freight Transport
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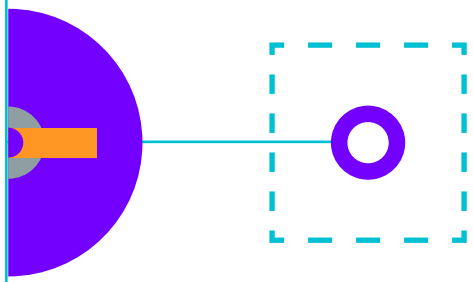
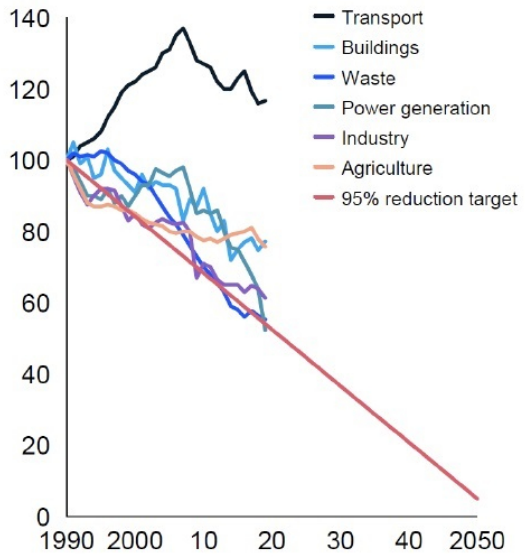
Agenda

1. Introduction and Motivation
2. Related Literature
3. Research Design
4. Preliminary Results
5. Conclusion



Decarbonisation in transportation

Normalised climate impact of individual sectors in the EU - history and projection



EU Green Deal: Climate neutrality by 2050 and reduction of CO_2 emissions by 55% by 2030 as intermediate target[1]

55%

Road freight transport accounts for 6% of European CO_2 emissions[1]

6%

CO_2 emissions from road freight transport have **increased** by 15% **within 25 years** (1995-2020)[2]

15%

99% of transport service providers are classified **as small and medium-sized enterprises (SMEs)** with fewer than 50 employees[3,4]

99%

Rising CO_2 emissions in the transport sector increase the **need for action**. The responsibility for transport-related emissions is distributed among **many stakeholders**.

[1]European Commission (2021), [2]The Umweltbundesamt (2022),
[3]Toelke and McKinnon (2021), [4]Lammgård and Andersson (2014)

Relevance of CO_2 reporting and present challenges

Relevance of CO_2 reporting

- **Recording** company's own **carbon footprint** is the first step toward decarbonising[1]
- Only **quantification** of emissions enables **setting of** meaningful **reduction targets** and monitoring of progress[1]
- Increasing **regulatory pressure** due to new sustainability **reporting obligations** (e.g. CSRD)[2]

Challenges

Fragmentation of GHG calculation methods leads to different results and **lack of comparability**[3]

Lack of accuracy due to use of **standard emission factors** or **industry average data** instead of use of primary data[4,5,6]

Increasing demand for emission data by shippers requires **information exchange**[7]

Existing **barriers** to the **exchange of transport and logistics data** (matter of trust & lack of digitisation)[8]

Reporting of CO_2 emissions based on primary data increases **transparency** and (to some extent) **accountability**.[6] The use of primary data along the transport chain requires the **measurement** and **sharing** of relevant data.

[1]McKinnon (2018), [2]European Council (2022), [3]Hülemeyer and Schoeder (2019), [4]Petersen and van Almsick (2022), [5]McKinnon and Piecyk (2010), [6]Stenzel and Waichman (2023), [7]McKinnon (2023), [8]LIHH and Appanion (2020)

Research objective and research questions

Research Objective

Gaining a better understanding of transport SMEs' business strategies in sharing emission data and its impact on competitiveness.

Research Questions

1. What factors influence the (order-related) calculation and reporting of emissions at transport SMEs?
2. What influence does the sharing of emission data have on the competitiveness of transport SMEs?

Method

Mixed-methods approach with a qualitative study followed by a quantitative study:

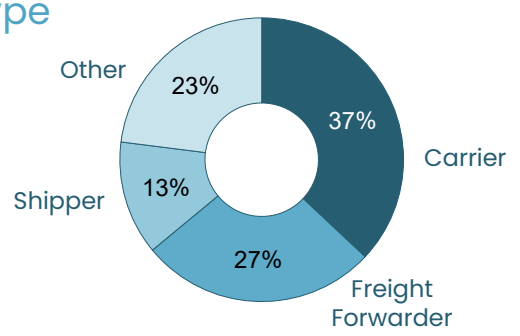
- Qualitative study based on **semi-structured interviews** (n = 30)
- Quantitative study based on a **web-based questionnaire** (n = 82)

Design and sample of the interview study

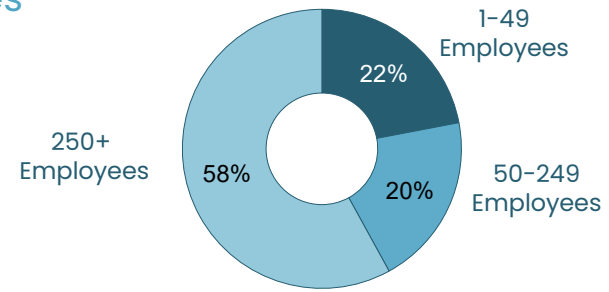
- Interviews were conducted as part of the project **“Holistic reporting of transport emissions from SMEs”**
- **Time period:** December 2022 until April 2023
- **Number of interviews:** 30 with 34 experts
- The interview data was analysed using **qualitative content analysis** following Mayring (2020)
- Company Type[1]:
  - **Carrier**: operates vehicles with the purpose of transporting goods
  - **Freight Forwarder:** organises the transport without operating own vehicles
  - **Shipper:** sends goods for transport

Sample Overview

Company Type



Employees[2]



[1]SFC (2019), [2]European Union (2020)

Overview of findings: strategic orientation

Internal Factors

Strategic orientation
- **Proactive**
- **Reactive**

Motivation

Resource availability

Data availability

Willingness to share data

External Factors

ket characteristics

npetitive pressure

Regulatory

Calculation methodology

Customer demand

entives

tal expec ions

„Where you are a pioneer […], you also have the potential to differentiate yourself from other carriers who are not yet as far advanced." #Carrier 1

Calculation and Reporting of Transport Emissions

„So, in fact, on the carrier's side activities only happen if the customers shout loud enough for it." #Tool Provider 1

There are different strategic orientations on this topic among companies in this sample. Companies that have proactively anchored sustainability in their strategy perceive an **opportunity to differentiate** themselves from competitors.

Overview of findings: willingness to share data

Internal Factors

Strategic orientation

Motivation

Resource availability

Data availability

Willingness to share data

External Factors

ket characteristics

mpetitive pressure

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Calculation and Reporting of Transport Emissions

„I think it is […] rather beneficial to customers because it […] can of course also strengthen the bond with the customer.“ #Shipper 1

„[It] starts with trust and what is meant by that, are economic disadvantages, that the carriers feel they could be […] analyzed,[…] business could be reallocated or maybe such action could apply in the next rate negotiation“ #Shipper 2

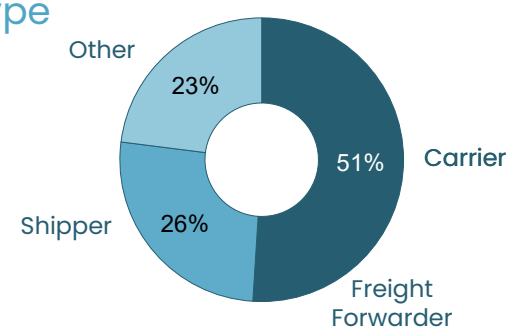
There are different perceptions on sharing emission data in terms of **opportunities** and **risks**. Companies with a proactive strategy tend to emphasise the opportunities.

Design and sample of the quantitative study

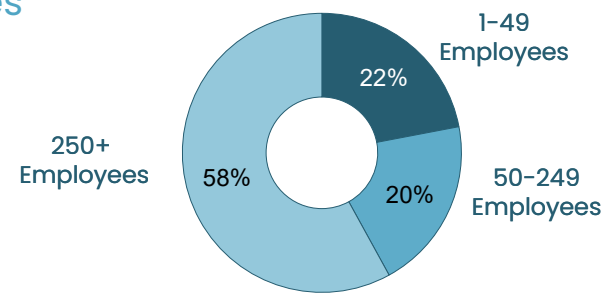
- **Survey** with primarily German logistics service providers to **confirm** and **validate** results of the interview study
- **Focus of the study:** Sharing of emissions data between carrier and shipper and its influence on competitiveness
- **Time period:** June 2023 until September 2023
- **Number of participants (total):** 107
- **Number of participants (shipper and carrier):** 82
- **Medium:** web-based questionnaire
- Statistical analysis according to Hair et al. (2009)

Sample Overview

Company Type



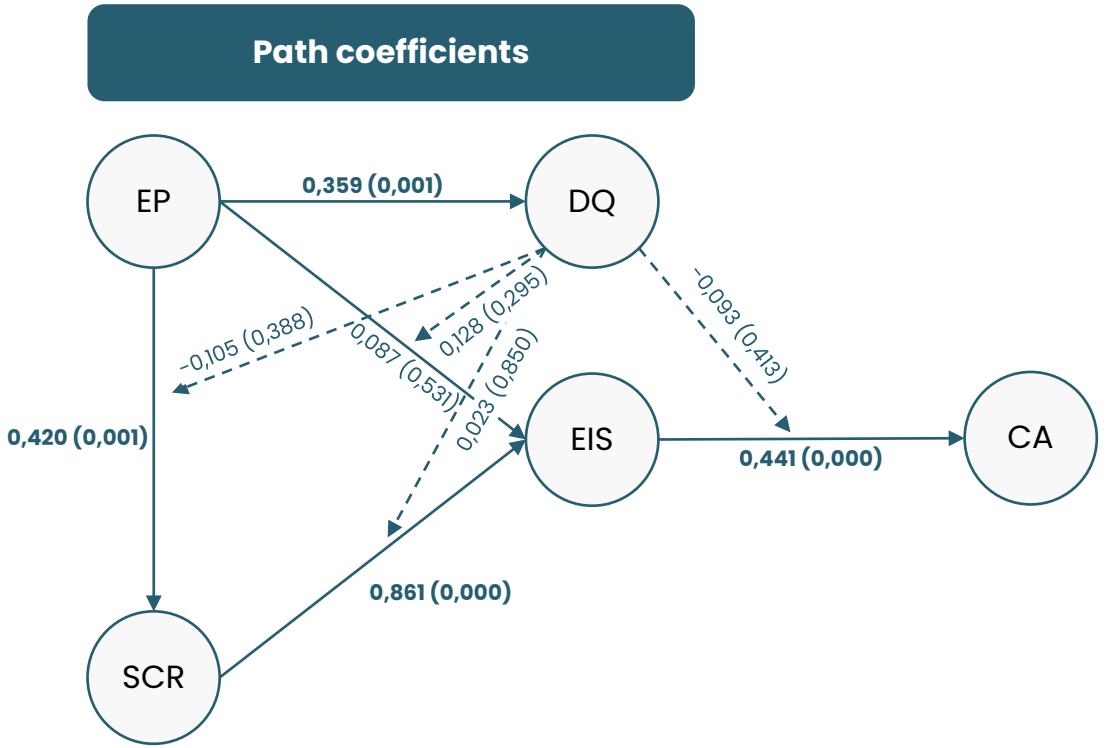
Employees



Overview of Findings: Structural path model

- **Structural path model** based on the overserved **relationships** in the literature and the interviews was estimated with **PLS-SEM**
- **Goal:** Analysing the relationship in the path model and explaining a target construct from a prediction perspective[1]
- Use of validated measurement constructs in the questionnaire

	Construct
EP	Environmental Proactivity[2]
SCR	Shipper-Carrier Relationship[3,4]
DQ	Data Quality[3]
EIS	Emission Information Sharing[3]
CA	Competitive Advantage[3]



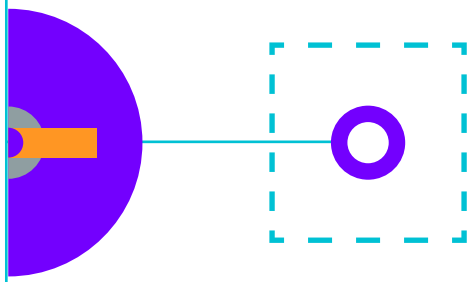
- Companies with a **proactive environmental strategy** tend to have a **closer relationship** with their business partners.
- A greater **environmental proactivity** improves the **quality of exchanged emission data**.
- A closer **shipper-carrier relationship increases** the **level of information sharing** between the business partners.
- A higher level of **emission information sharing** is perceived by companies as a **competitive advantage**.

[1]Hair et al. (2022), [2]Bowen et al. (2001), [3]Li et al. (2006), [4]Cai et al. (2022)

Conclusion and Further Research

- The growing importance of primary data for calculating transport emissions requires emission information sharing between carriers and shippers.
- Strategic orientation of companies and their shipper-carrier relationship has an impact on their willingness to share emission data.
- Companies perceive the improved access to data due to a higher level of information sharing as a competitive advantage.
- **Further Research:**
  Investigating how companies can strategically prepare for the exchange of emission data and how cooperations can be established

Thank You



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Research Project

Holistic reporting of transport emissions from SMEs (GATE)
(cooperation of Hamburg University of Technology and Kühne Logistics University)

Web: https://gate.logu.tuhh.de/

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