

Green Logistics

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Istanbul Technical University
ERASMUS Guest Lecture



1. Introduction
2. Strategy Level
3. Organisational Level
4. Operational Level
5. Conclusions

1. Introduction



In **logistics** several **major trends** are driving forces of change, **sustainability** and **innovation** among them.

Globalisation

→ Complex & Volatile SC

Security

→ Physical & Information

Trends in Logistics

Innovation

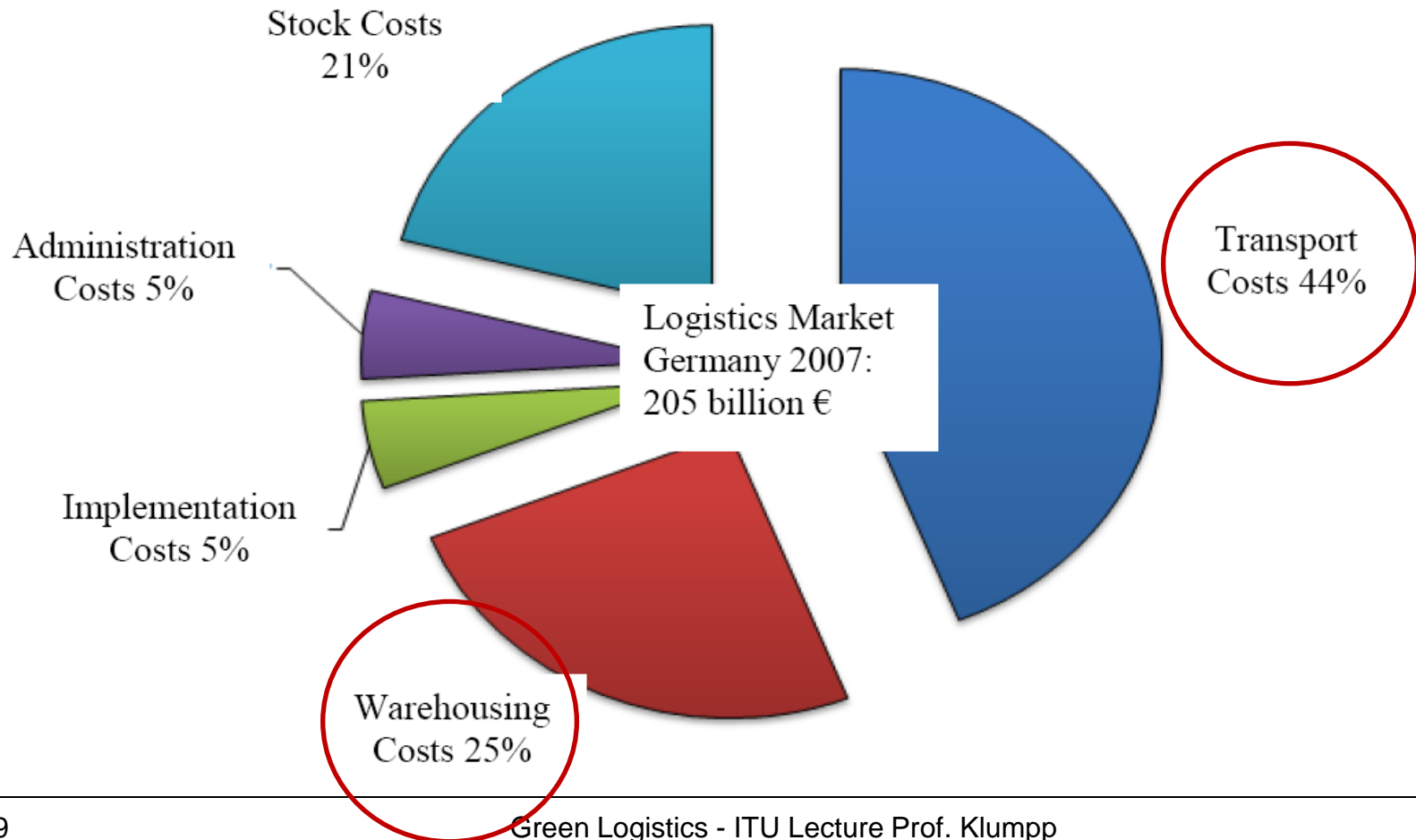
→ Technology / Integration

Sustainability

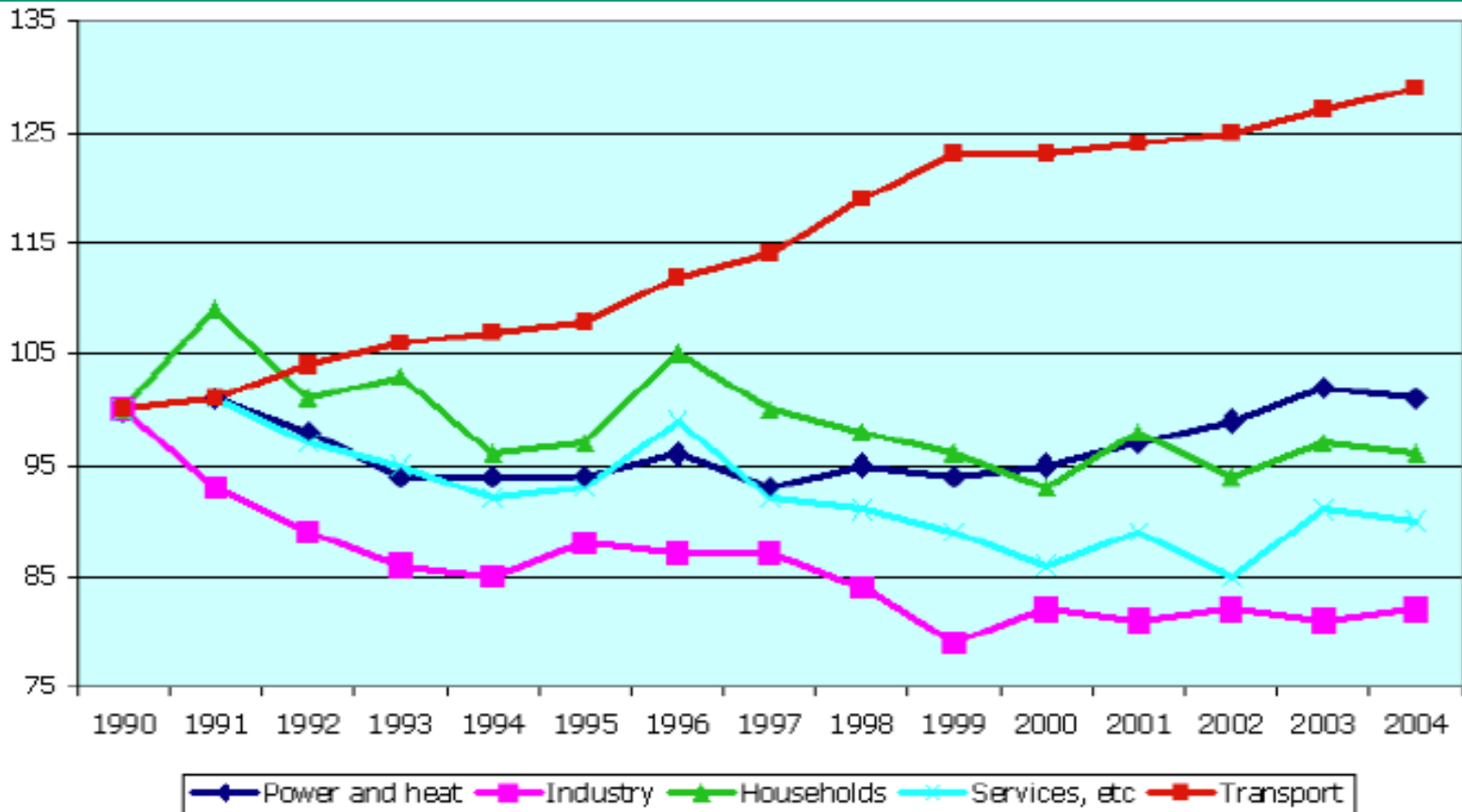
→ Energy & Pollution

Source: Straube, F., Pfohl, H. (2008), Bundesvereinigung Logistik (BVL) Berlin.

Logistics is a huge sector with non-neglectable **ecological impact** as in transport and warehousing.



Facts: 21% of total CO₂ emission in the EU belong to traffic, being the only sector sharply rising (Source: EMCC 2008, p. 9, 2-below)



Operation and Decision Levels

Strategy Level

- Plant and Warehouse Location
- How to reduce transport?

Optimization

Organisation Level

- Energy/Ressource/Site Management
- Which transport mode to use?

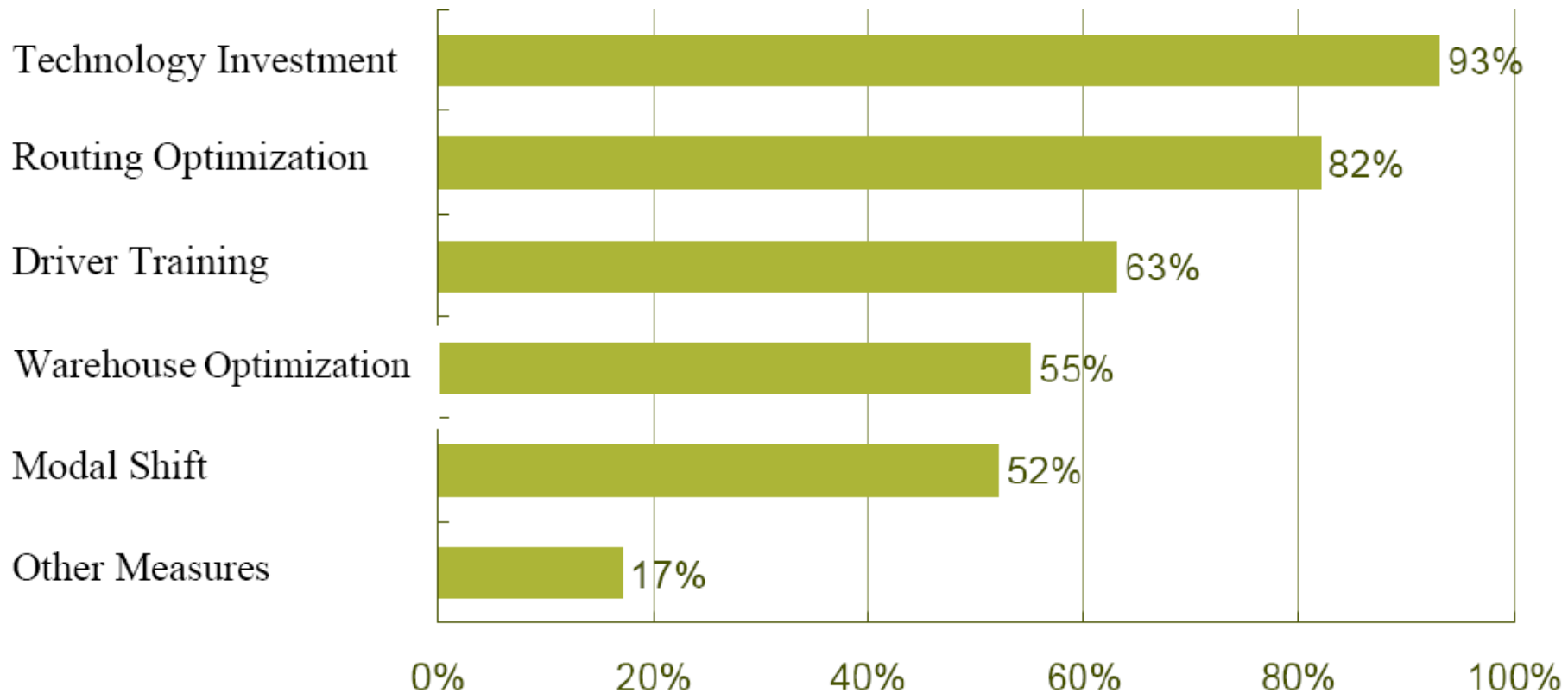
Checklist

Operative Level

- Supply Chain Event Management
- Which sort of trouble shooting?

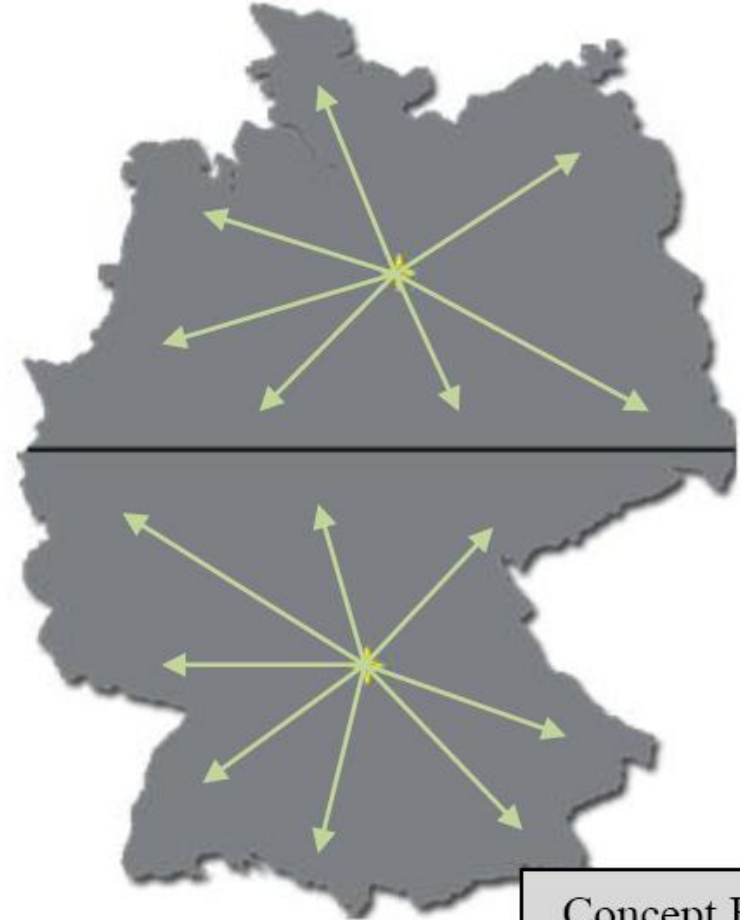
Information

Companies answer the **challenges** in most cases with **technology investment** but also optimization.



2. Strategy Level

Concept A



Concept B

Logistics concepts try to improve **transportation costs**.

2. Strategy Level

Decentral
Warehousing
(Status quo)

(I) (More)
Central
Warehousing

→ Cost Reduction
→ Increasing
Pollution

(II) Decentral
Warehousing
with RFID

→ Cost Reduction
by reduced security
stock level
→ No increased Poll.

Logistics concepts shall optimize for **several** objectives.

Stock costs rise with the number of warehouses.*)

- This is because the **average inventory** to meet a predetermined **availability level** in a market rises with an increasing number of warehouses whose inventories are held to supply the market
- The effect is primarily caused by **safety stock levels**

Besides several additional advantages by using **RFID** a benchmark study (2003/04) on returnable transport items (RTI) shows that total **safety stock level can be reduced by 10 %**)**

*) Source: Pfohl, H. (2004) Logistikmanagement, p. 117

**) Source: www.logica.com/pdf/rfid_study.pdf (2004), p. 43

2. Strategy Level

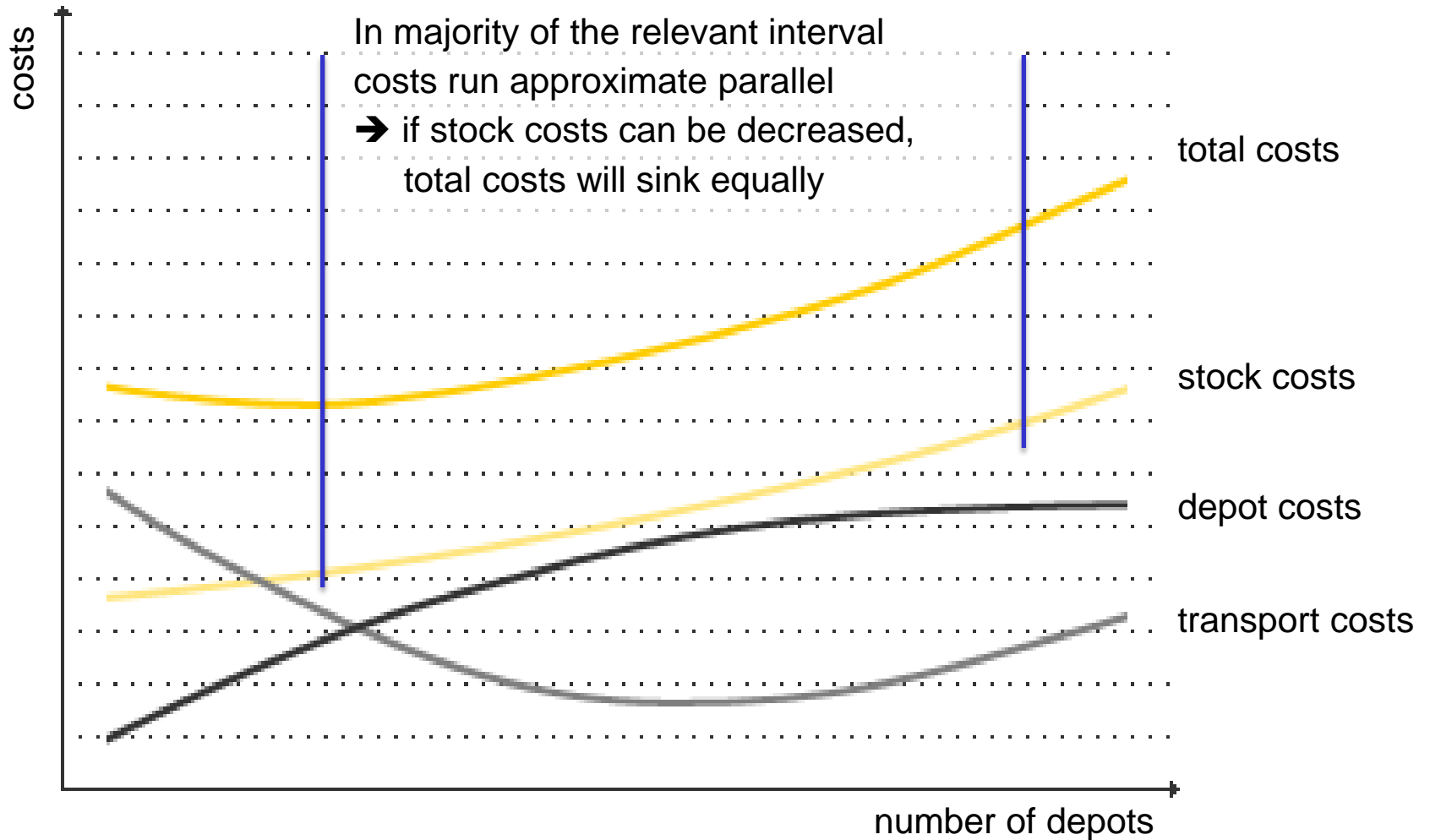


Illustration: Stock/Lambert (2001) Strategic Logistics Management, p. 409

2. Strategy Level

Benefit	Values
<p>Handling costs per RTI in a distribution centre through increased efficiency</p>	<p>> Without RFID, the costs per pallet are € 6.14 (all handling and storage costs)</p> <p>> With RFID, the costs are € 5.62, saving € 0.52</p> <p>> This is an increase in handling efficiency of 8.5 % per pallet</p>
<p>Reduction in safety stock levels of RTI</p>	<p>> The total RTI pool can be reduced by 10 % through optimization</p>

RFID & RTI' - Assumptions

The chosen values are based on empirical data, on the basis of market data and interviews. Following values were used:

Costs:

- RFID tag price: € 0.50; installation of RFID readers per dock door: € 30,000.00
- In expensive pallet: € 6.50, Roll container: € 50.00

The generic supply chain is structured as follows:

- Each link occurs once in the supply chain, apart from the suppliers and stores, which occur 15 times
- Total RTI quantity to flow through the supply chain is 10,000 per day
- The total RTI stock in the chain is 100,000.
- The collection area is the pool manager and owner of the RTI
- 7 working days per week assumed
- No distinction has been drawn between central and regional distribution centres
- Each of the 15 stores has one dock door
- The production facility has a total of 25 dock doors

Depreciation period for investments:

- Tags: 7 years (same as the lifetime of the RTI); Readers and antennas: 5 years, Interest costs: 7 %

Source: www.logica.com/pdf/rfid_study.pdf (2004) p. 43

Logistics costs can be lowered by using RFID, concerning e.g.

- + Handling costs
- + Stock costs
- + Others as i.e. increasing transparency, traceability



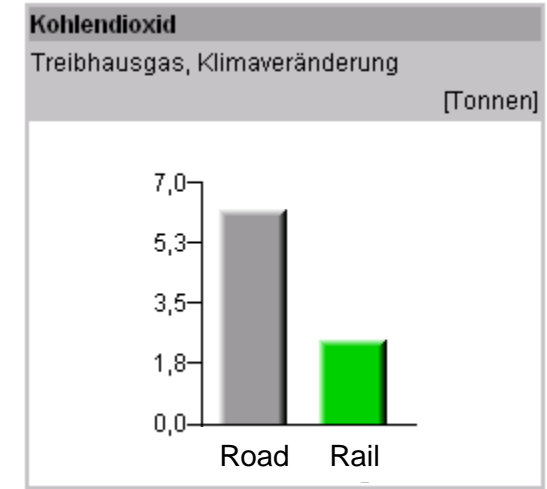
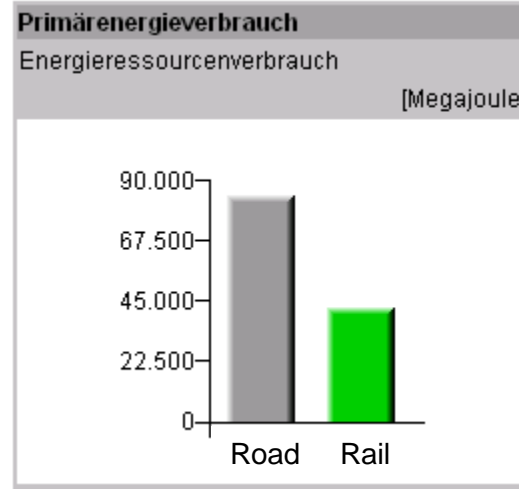
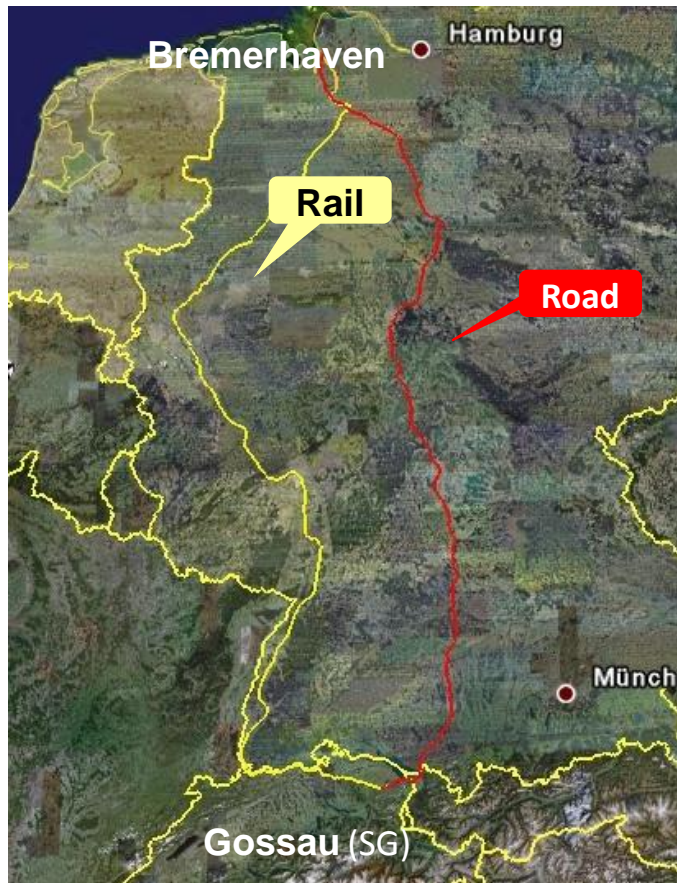
It could be possible to **decrease costs so far**, that no significant cost advantage can be reached by **centralisation** (with increasing environmental pollution)

Indicators – KPI for Green Logistics

input (energy) efficiency	output (pollution) reduction	safety objectives	diversity objectives
energy consumption (KJ)	CO ₂ emission (to)	risk of DNA mutation	risk of species extinction
land consumption (m ²)	other greenhouse gases emission (to)	human safety	risk of habitat areas extinction
non-renewable resources consumption (kg/to)	SO _x emissions (to)	accidental pollution (prevention)	
water consumption (liters)	NO _x emissions (to)		

3. Organizational Level

Logistics research is usually comparing **ceteris paribus alternatives** – e.g. transport mode decisions.



- ➡ 50% less energy consumption for rail transport
60% less CO₂ emission compared to road
- ➡ With increasing road pricing and also increasing congestion rail cargo may be the strategic alternative

3. Organizational Level

Strengths
Sustainability,
System Quality,
Price Advantage

Weaknesses
High Fixed Costs,
Disadvantages in Flexibility
and Service,
Interoperability and Track
Connection Problem (Last Mile)

SWOT
RAIL CARGO

Chances
Co-operation for Increasing
Cargo Loads (Scaling),
Co-operation in order to
Enhance Quality,
Systems / SC Steering (4PL)

Risks
Business Cycle and
Skaling Risks,
Technology Implementation,
Competition and Price Decrease,
Insourcing Lorry

3. Organizational Level

Sustainable Logistics by ...

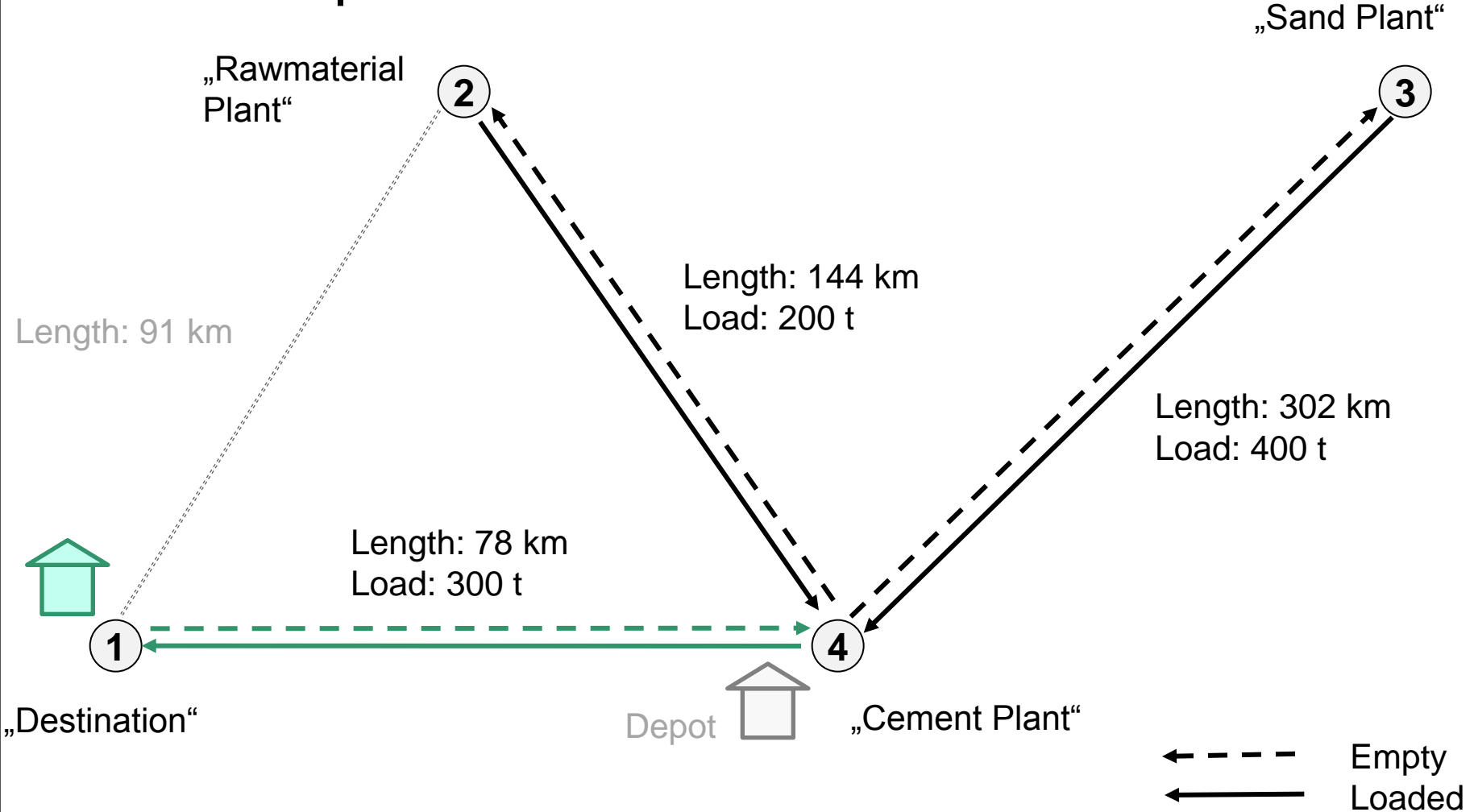
- ... new motor technologies.
- ... information technologies.
- ... recycling and packaging.
- ... DGR observation.
- ... co-operative logistics.
- ... optimization routines.



But still:
Single, **not**
integrated solutions
and innovation
projects (c.p.)

3. Organizational Level

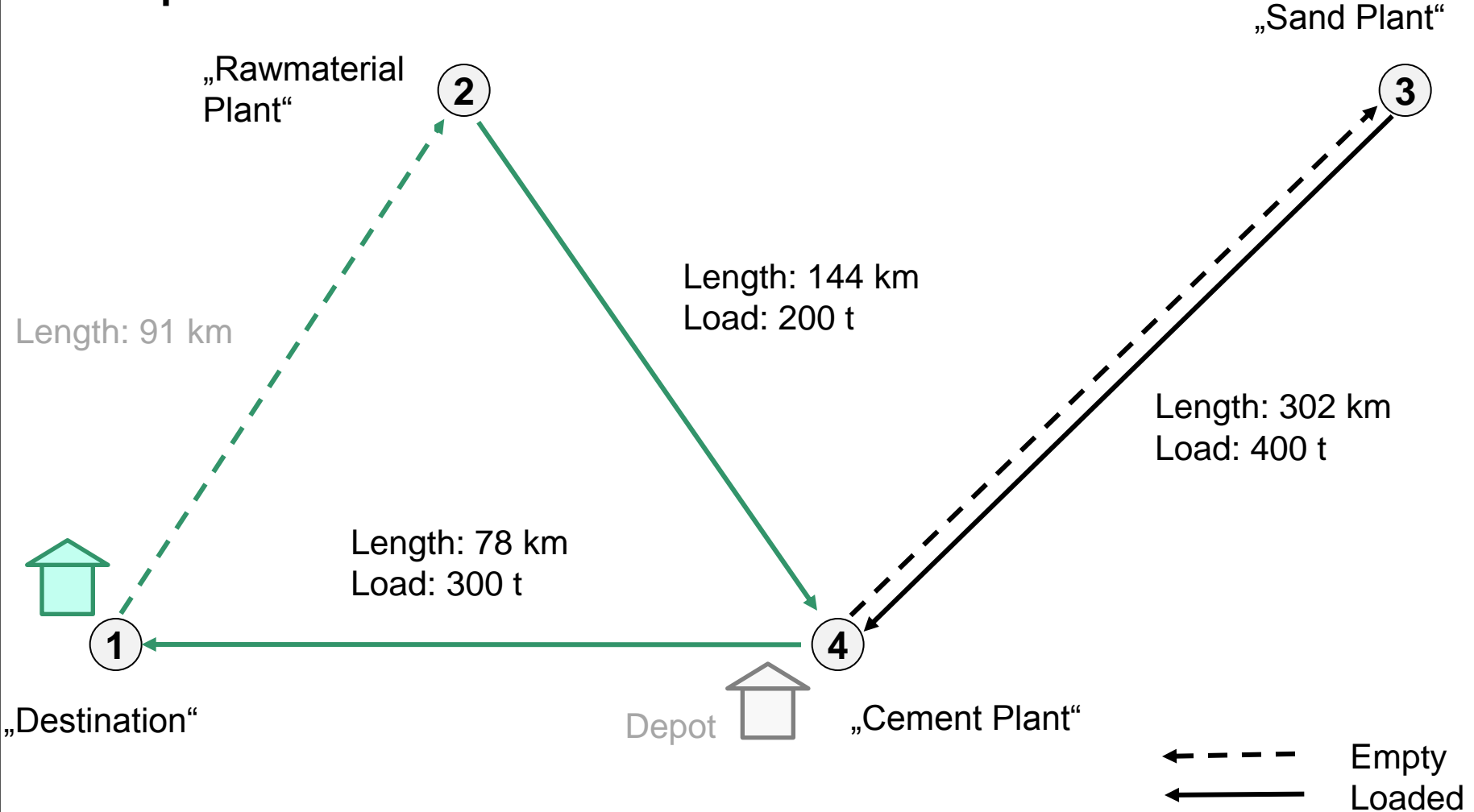
Real Transport Problem



* Real Business Date exchanged.

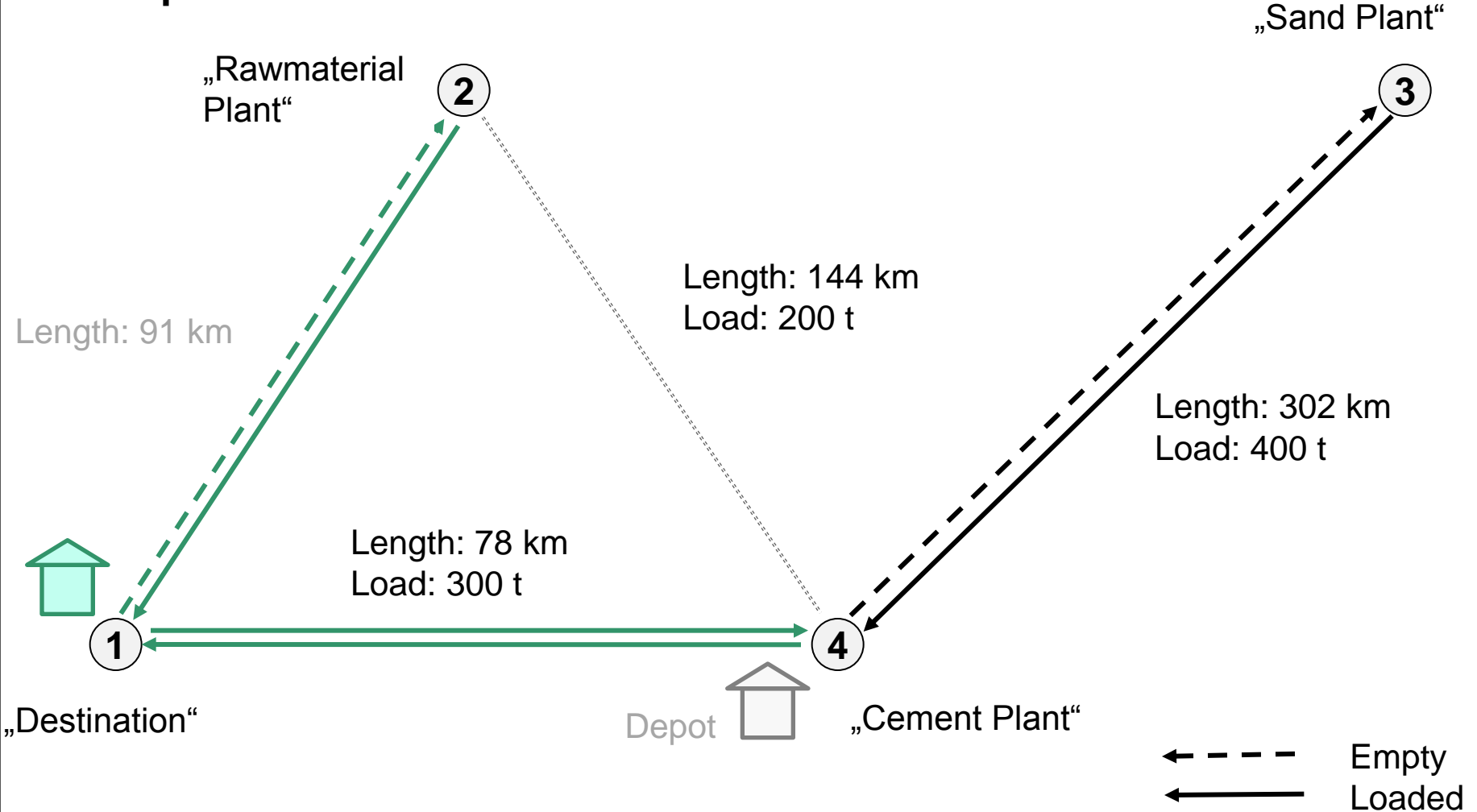
3. Organizational Level

Optimization I



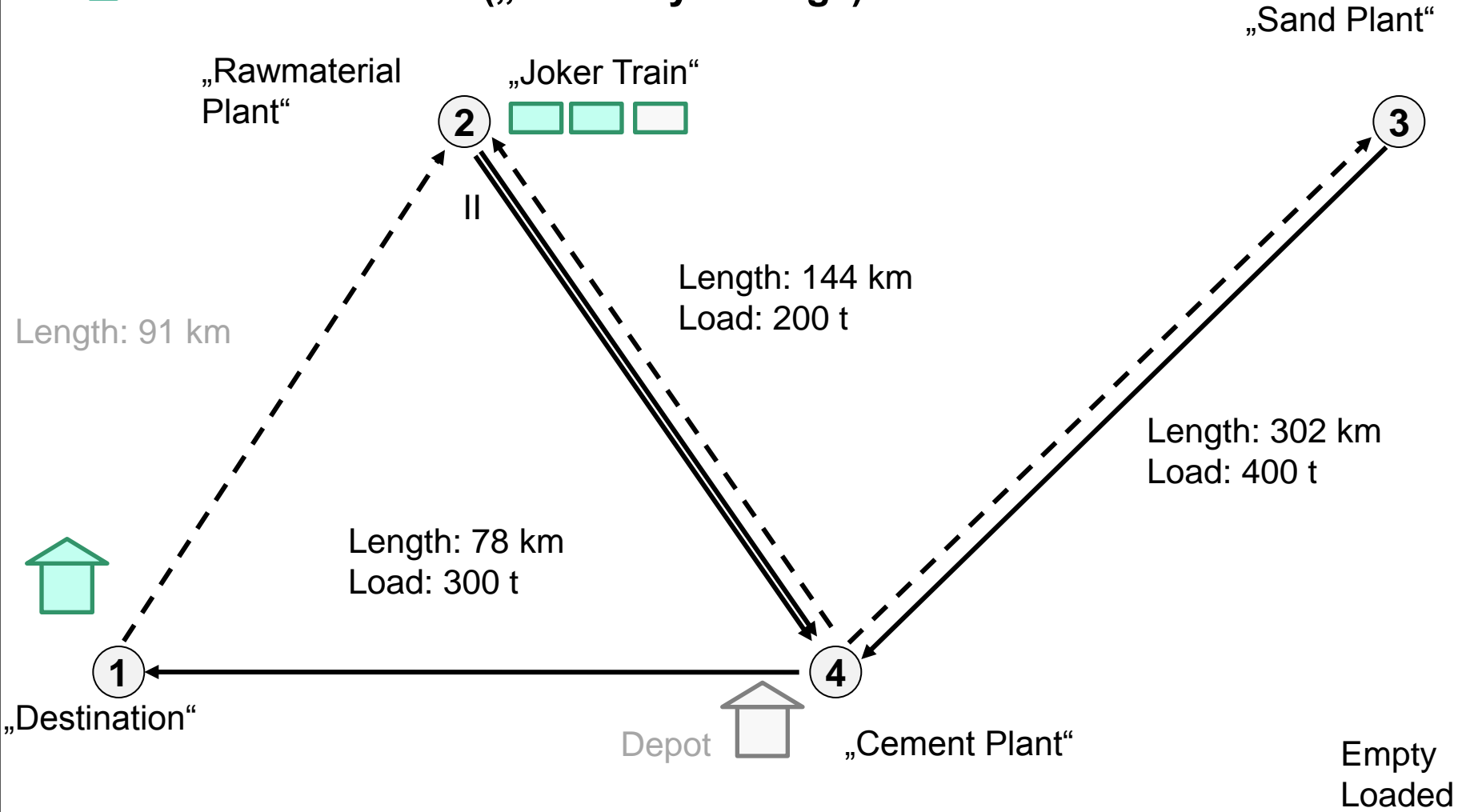
3. Organizational Level

Optimization II

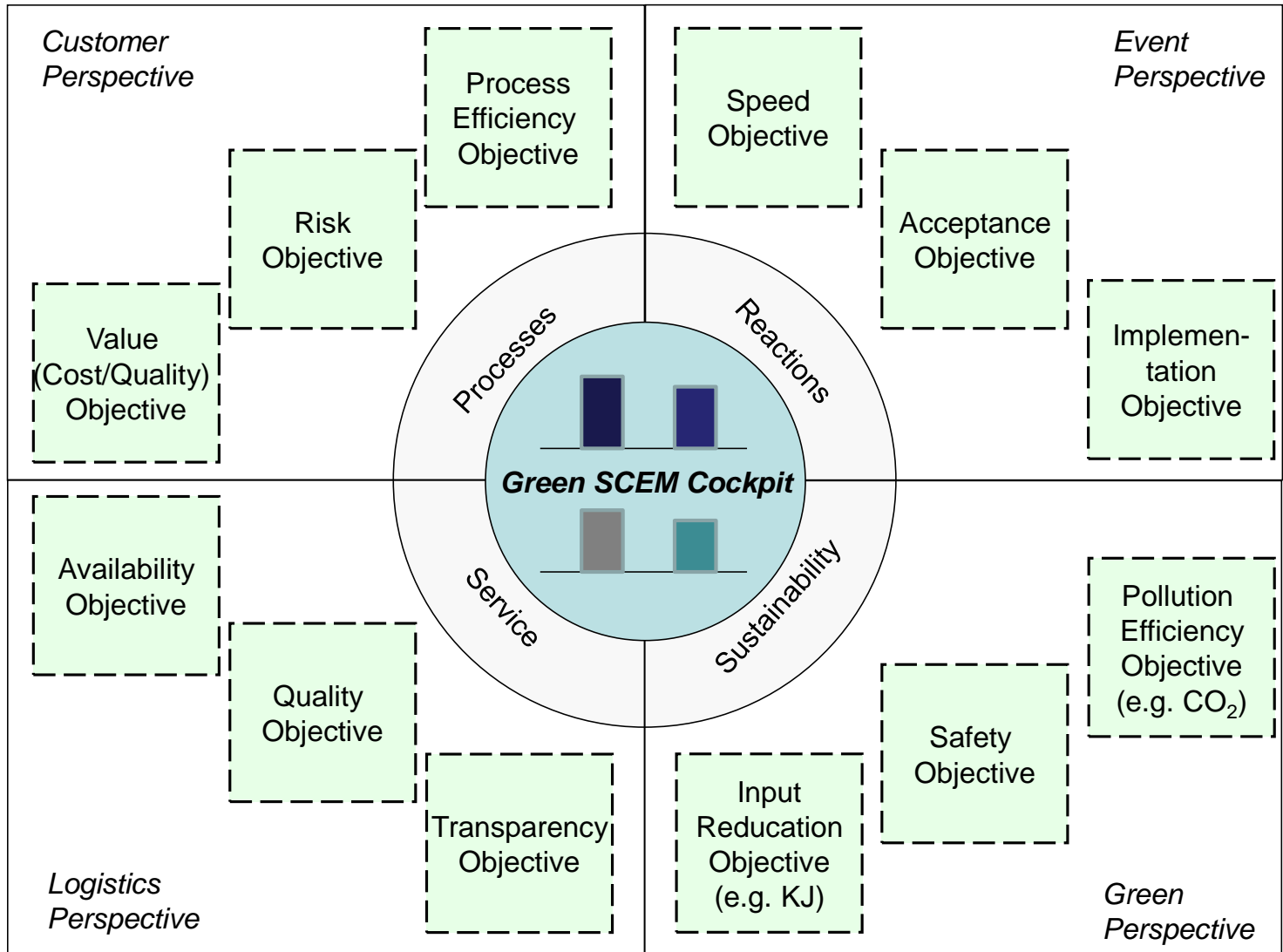


3. Organizational Level

□ Practical Solution („flexibility is king“)



4. Operational Concept SCEM



- **Green Logistics** needs concepts and decisions on a strategic, organizational and operative level.
- Both objectives of **technology innovation** and **sustainability** should be **included** in planning and concept outlining activities.
- **Awareness** has to be enhanced: There are some crucial **strategy decisions** as e.g. shown for warehousing structures which define the interaction of technology innovation and sustainability on a long-term basis.
- **Best practice examples** should be identified and examples for concepts **integrating sustainability in logistics** should be communicated.

Green Logistics

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Thank you very much
for your attention.

