

Summary

Freight transport is steadily increasing throughout Europe, especially on the road, and is responsible for disproportionately high environmental pollution. Overall, too little attention is paid to social and environmental issues, exceptions confirm the rule. Following two topic discrepancies can be formulated:

1. The problem is the increasing freight transport across Europe on the road over longer distances, which leads to congestion and relatively high burden on residents and infrastructure and finally for the next generations.
2. Short sea container shipping industry is to be able to participate on certain transport routes with a larger share and to contribute to the sustainability goals.

Meanwhile, bottlenecks and congestion on the most important international routes reduce the efficiency of transport itself and lead to an increasing economic loss. An improvement in the infrastructure is not sufficient and only led to further traffic.

However, the European Union is particularly in favour of a continuation of the existing transport policy on behalf of countries and economies, although a different transport policy has long been requested for.

Moreover, Europe as a whole has pledged to ensure compliance with climate targets - recently at 2015 COP21 conference in Paris,

In particular, the transport sector is a major polluter and the proportion will increase relatively in the coming decades, most likely.

The latter conflicting objectives are the subject of the thesis. The costs of environmental protection in the respective assessment and allocation of environmental cost/burden has to be addressed. The concept of sustainable development (SD) is of central importance in order to resolve environmental and increasing resource issues.

Predicted performance characteristics for several major BSR routes of transport solution methodologies under a variety of conditions are presented and evaluated in the research work. In this context new analysis methods are explored as:

- Integration of ecological criteria in the selection of transport alternatives;
- The development of a Transport Quality Index for comparative studies;
- Monte Carlo simulation for risk calculation of various drive systems;
- A risk optimization tool for the development of a ship-fleet portfolio;

- A NPV analysis regarding various abatement measures;
- Presentation of alternative freight transport options for selected routes;
- Future perspectives in the context of additional transport demand.

Despite the complexity of the task, an energy and environmentally improved solution in the transport sector is considered solvable, corresponding scenarios are simulated and comparisons have been made.

Chapter I starting with sustainable development in view of transport problems. The concept of sustainable development (SD) is of central importance in order to resolve environmental and resource issues. Sustainable solutions require interdisciplinary approaches between economic, social and environmental aspects that have been documented in the chapter.

Chapter II looks the European transport policy and its intentions in the field of transportation overall, documented in the White Paper.

Chapter III addresses environmental issues such as sustainable technology solutions for ships in the Baltic Sea Region (BSR).

Chapter IV describes the current situation in the BSR with regard to the respective modes of transport. Future goods transport demand and alternative transport options are the topics of this chapter, and finally the development of Transport Quality Index (TQI) is a key issue.

Chapter V looks at the ship fleet from the perspective of a shipowner and calculates a ship portfolio and its risk. The aim is to have an efficient portfolio of different types of ships.

Chapter VI focuses on future projects such as the introduction of external costs and their consequences for the freight transport sector. Also the feedback of a questionnaire is the topic of this chapter.

The most important finding is that maritime transport and intermodal transport can make a significant contribution to certain transport routes in Europe, in terms of sustainable objectives.