

From mental to modal shift

Decision support for intermodal transport

The interest of academics, policy makers and transport-related companies for intermodal transport has increased strongly during the past two decades. After all, intermodal transport – defined as the transport of loadings units (such as containers) by different transport modes, without handling the goods when changing modes – is in many cases an alternative to unimodal road transport that has a smaller impact on society due to its lower emissions, accident risk, noise etc. The share of freight flows in the total transport market that opts for intermodal alternatives, however, remains limited both in Europe and in Belgium. Many different policies have nevertheless been introduced, and a vast body of literature has been developed, to facilitate and enhance the use of intermodal transport. Research shows that a major barrier to the increased use of intermodal transport relates to inertia and unawareness in decision-making. The research question tackled in this thesis therefore is: ‘(How) can different actors, involved in the transport system, be supported in their decision-making to increase the market share of intermodal transport in Belgium?’

The thesis describes the three major components of the transport system, which determine the modal split of freight transport: transport demand, supply and a broader policy framework. Each section includes a description of the ‘as is situation’ and describes the development of decision support systems aimed to help the corresponding decision-makers (shippers, transport- and network operators, policy makers) in making decisions that can trigger a mental shift. This mental shift relates to the awareness of the availability of qualitative intermodal solutions and must lead to a modal shift in the longer run.

The first section of this thesis, focusing on the supply side, describes the competitiveness of intermodal transport and shows that in particular intermodal barge transport can be price competitive on very short distances. Besides, a spatial analysis model was further developed that allows simulating the impact of changes in the infrastructural network, in transport costs and in customer preferences of shippers and forwarders. Regarding the supply of transport services, the potential impact of an allowance of longer and heavier vehicles (LHVs) in Belgium is evaluated. The analysis shows that when LHVs can bring a price reduction in road transport, the market areas of intermodal terminals can shrink drastically. A reverse modal shift from intermodal transport to LHVs has to be avoided, as in most cases this will have a net negative societal impact. Next, the same model is extended to determine optimal locations for additional intermodal terminals in Belgium. The research shows that the optimal location varies following the (policy) objective that has to be met.

The second section of this thesis, focusing on transport demand, discusses the factors determining the transport mode choice for the short-distance land transport of containers. The findings suggest that the demand characteristics for transport solutions are relatively heterogeneous and that the service offer can be improved by focusing on reliable deliveries and daily service frequencies, besides providing inexpensive solutions. Next, two complementary instruments are described that enhance both a mental and a modal shift, addressing shippers and logistics services providers. The instruments allow users to make a tailor-made modal choice decision, accounting for their specific requirements and flexibility.

The third and final part of the thesis focuses on the policy perspective. Different measures that can be used to make the hinterland transport to/from sea ports more sustainable are confronted with the decision criteria of the stakeholders concerned. Next, a methodology was developed to compare transport flows according to their modal shift potential, which allows identifying the most promising freight flows.

The conclusions, finally, provide an overview of how the described research can aid decision-makers by enhancing both a mental and a modal shift. It is also discussed how this research can be a leap towards the development of a synchromodal transport system and synchromodal decision support tools.