

Integrating High-Performance Transport Modes into Transport Networks: A Multidimensional Impact Analysis

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Abstract : In the EU, the transport sector accounts for roughly one fourth of the total greenhouse gas emissions. In fact, the transport sector is one of the main contributors of greenhouse gas emissions. Climate protection targets aim to reduce the negative effects of greenhouse gas emissions (e.g. climate change, global warming) worldwide. Achieving a modal shift to foster environmentally friendly modes of transport such as rail and inland waterways is an important strategy to fulfill the climate protection targets. The present paper goes beyond these conventional transport modes and reflects upon currently emerging high-performance transport modes that yield the potential of complementing future transport systems in an efficient way. It will be defined which properties describe high-performance transport modes, which types of technology are included and what is their potential to contribute to a sustainable future transport network. The first step of this paper is to compile state-of-the-art information about high-performance transport modes to find out which technologies are currently emerging. A multidimensional impact analysis will be conducted afterwards to evaluate which of the technologies is most promising. This analysis will be performed from a spatial, social, economic and environmental perspective. Frequently used instruments such as cost-benefit analysis and SWOT analysis will be applied for the multidimensional assessment. The estimations for the analysis will be derived based on desktop research and discussions in an interdisciplinary team of researchers. For the purpose of this work, high-performance transport modes are characterized as transport modes with very fast and very high throughput connections that could act as efficient extension to the existing transport network. The recently proposed hyperloop system represents a potential high-performance transport mode which might be an innovative supplement for the current transport networks. The idea of hyperloops is that persons and freight are shipped in a tube at more than airline speed. Another innovative technology consists in drones for freight transport. Amazon already tests drones for their parcel shipments, they aim for delivery times of 30 minutes. Drones can, therefore, be considered as high-performance transport modes as well. The Trans-European Transport Networks program (TEN-T) addresses the expansion of transport grids in Europe and also includes high speed rail connections to better connect important European cities. These services should increase competitiveness of rail and are intended to replace aviation, which is known to be a polluting transport mode. In this sense, the integration of high-performance transport modes as described above facilitates the objectives of the TEN-T program. The results of the multidimensional impact analysis will reveal potential future effects of the integration of high-performance modes into transport networks. Building on that, a recommendation on the following (research) steps can be given which are necessary to ensure the most efficient implementation and integration processes.

Keywords : drones, future transport networks, high performance transport modes, hyperloops, impact analysis

Conference Title : ICTM 2017 : International Conference on Transport Management

Conference Location : Rome, Italy

Conference Dates : December 11-12, 2017