

Preface

The transport system has, is, and will continue to be a foundation of the economy of each country/nation, as well as that of the world. In particular, in the twenty-first century, it will further strengthen its role in integrating and globalizing economic activities, and will thus also influence the quality of people's lives. In the past, transport demand in terms of both the number of passengers and the volumes of freight/goods shipments has been constantly growing in the medium- to long-term period(s) despite being affected, from time to time, by the local and global economic and political crises. This demand has been satisfied by the capacity of the transport system generally consisting of the transport infrastructure, transport means/vehicles, and workforce. Material, energy, and labor has been consumed in order to provide transport services according to the specified internal organization containing operating rules and procedures, and under given external regulation and constraints. On the one hand, such developments have produced the above-mentioned positive contributions to the national economies and social welfare. On the other, they have affected the environment and society in terms of land use/take for expanding the transport infrastructure, energy consumption from non-renewable sources (coal, crude oil, and natural gas) and related emissions of Green House Gases (GHG), local noise, congestion, and safety (traffic incidents and accidents). Since both passenger and freight transport demand are predicted to double over the next 20 and triple over the next 50 years, solutions for serving them more efficiently and effectively while mitigating impacts on the environment and society need to be provided. Therefore, in addition to creating transport policies and monitoring schemes aiming to reduce physical transport demand (i.e., telecommuting) and implementing advanced transport planning and operating tools and techniques, potential solutions also lie in developing advanced technologies individually and/or in combination with advanced operational concepts. Generally, this implies providing: (i) sufficiently capacitated and environmentally friendlier, i.e., more energy/fuel efficient, cleaner, quieter, and safer, technologies based on an increased use of renewable energy/fuel sources (such as, for example, biomass fuels (liquid) hydrogen, wind and solar energy), nanotechnologies, and information technologies; and (ii) the advanced organizational and operational forms and concepts of using transport infrastructure, transport means/vehicles, and accompanied resources.

Experience so far indicates that commercialization, i.e., development and implementation, of the advanced components—technologies and related

operational concepts—of the transport system has been an evolutionary rather than a revolutionary process. The main reasons include: (i) a rather long time for maturing up to full commercialization; (ii) an inherent threat from confronting existing and forthcoming even stricter institutional/policy regulation/constraints; (iii) relatively high development costs; (iv) frequently uncertain long-term overall commercial and social feasibility; and (v) a relatively long path for obtaining operational certification implying full environmental and societal/policy acceptance. Under such circumstances, most such transport technologies and operational concepts, except a couple of futuristic ones, have been mostly gradually updated and improved, usually based on the closest previous counterparts. In the given context, this justifies deeming them “innovative” or “advanced” rather than completely “new”. In this book, the attribute “advanced” is used for all such technologies and operational concepts.

The book describes analysis, modeling, and evaluation of performances of the selected advanced transport systems. Some of them have already been commercialized, i.e., implemented and operationalized, and/or are planned to be so, while others are still at the conceptual level waiting for further elaboration. Their performances are considered as derived from the technical/technological design and solutions of the infrastructure, transport means/vehicles, and supporting facilities and equipment used according to the specified operational rules and procedures, and economic, environmental, social, and policy conditions/constraints.

Analysis and modeling implies examination of their infrastructural, technical/technological, operational, economic, environmental, social, and policy performances. Evaluation based on a Strengths, Weaknesses, Opportunities and Threats (SWOT)-like analysis implies assessment of the advantages and disadvantages of these systems. In such context, Strengths and Opportunities are considered as advantages, while Weaknesses and Threats are considered disadvantages. Both are considered from the aspects of academics/researchers, but also from those of particular actors/stakeholders involved such as users of transport services—passengers and freight/goods shippers/receivers, transport infrastructure and service providers/operators, investors, policy makers at different institutional levels (local, national, international), and members of the local community/society.

Particular advanced transport systems have been selected according to the following criteria: (i) the level of advancement of particular performances; (ii) representativeness through transport modes (rail, road, air, water/sea, inter-modal); (iii) their spatial scale (area) of operation (urban and inter-urban); (iv) category of demand served (passengers, freight/goods); (v) availability/accessibility of relevant information (from science-based and publically-accessible relevant sources); and (vi) the level of systematic scientific elaboration as compared to that used in this book.

The selected advanced transport systems are clustered in the book’s chapters respecting the type and number of their advanced performances independently of the transport mode, spatial/geographical scale of operation, and type of transport demand they serve.

The widely dispersed and in some cases scarce material collected from the various available sources such as research (including my own), literature (books and papers in scientific and professional journals), and websites is presented from the traffic and transport engineering and planning and design perspective. Most facts and issues are scientifically supported and accurate regarding the fundamental relationships between particular variables (parameters). Nevertheless, some of them, particularly those related to futuristic concepts, contain a level of fuzziness in the absolute terms, which, however, does not compromise their relevance in the given context. As such, the book aims to be informative as much as possible but by no means exhaustive—to the contrary, it intends to provide academics, researchers, consultants, policy/decision makers, and professionals from the transport industry and related fields with material for current and future research and development of the transport system.

October 2013

Milan Janić

Advanced Transport Systems

Analysis, Modeling, and Evaluation of Performances

Janić, M.

2014, XXI, 408 p. 101 illus., 16 illus. in color., Hardcover

ISBN: 978-1-4471-6286-5