


Lecture Notes in Intelligent Transportation and Infrastructure
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Aleksander Sładkowski *Editor*

Modelling of the Interaction of the Different Vehicles and Various Transport Modes

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Editor
Aleksander Śladkowski
Silesian University of Technology
Katowice, Poland

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Preface

Studying modern fiction, one can see that many authors note certain changes in the perception of the world around us. Very often the events of a particular story take place in different countries and even on different continents. A hundred years ago, it would have been difficult to imagine such a plot. In 1930, a special term appeared—globalization. We can, of course, give a scientific definition of this term, for example, «the development of an increasingly integrated global economy marked especially by free trade, free flow of capital, and the tapping of cheaper foreign labor markets».¹ This term has many definitions that ultimately denote the same.

It is based on the improvement of means of communication, if by this we mean the development of means of communication, the generalization of financial markets, and the placement of means of production in different countries. And, nevertheless, the basis of all this is the development of means of transport. It can be said that without the transport industry, no globalization would have been possible. Therefore, the development of international transport systems is currently more relevant than ever.

The main idea of writing this monograph was to familiarize readers with the experience of the development of transport systems in various countries, which differ in both the level of economic development and the degree of integration into the international community. However, often problems in the development of the transport industry in these countries are similar and the proposed solutions, which are developed in less economically developed countries, can also be used in highly developed countries.

Another idea was to consider issues related to the problems of delivery of goods on the most loaded routes, which is the transport connection between the countries of East and Southeast Asia and the European Union. Obviously, this is due to the new concept of the new Silk Road. This concept was formulated in 2013 by the

¹Merriam-Webster. Globalization (2018) URL: <https://www.merriam-webster.com/dictionary/globalization>.

President of China Xi Jinping and then supported at various levels by a number of top leaders of countries participating in this process. In the future, this initiative was called “Belt and Road” initiative.²

No less relevant are the problems of transport, as the main component of the so-called smart city. All these ideas are based not only on new constructive solutions, but also on the issues of modeling transport systems. The last aspect was put in the title of the book that was brought to the attention of readers.

This monothematic monograph is a collective work of scientists representing scientific and educational organizations from different countries: Bulgaria, Italy, Kazakhstan, Poland, and Russia. As stated above, the book discusses the interaction of various types of transport and individual vehicles, and model transport systems.

The first parts of the book are largely focused on the problems of rail transport, its interaction with other modes of transport, as well as comparing the transport of various modes of transport. In particular, the part written by Prof. S. Stoilova considers a multi-criteria assessment of transport systems, including systems based on rail transport. Various optimization methods are proposed. The main goal of the research was to adapt the methods developed for railway transport for other types of transport.

The next part, the author of which is Dr. K. Markowska, is devoted to the quality problems of logistics processes at their different stages, ranging from preliminary planning, receiving an order, to its implementation. Logistic operators, transport companies, or customized freight handlers, which are mainly engaged in railway transportation, as well as their connection with other types of transport, were the objects of analysis.

The third part of the monograph, which was jointly prepared by Kazakh and Polish authors, is quite close in subject. This part is devoted to modeling (forecasting) rail transportation and short-term planning. Very often, the problems of such planning are associated with an insufficient amount of preliminary information. Intellectual neural networks allow to solve this problem.

In the part that is written by teachers and researchers of the Sapienza University of Rome, marshaling yards are considered that combine different types of transport, but the key one is railway transport. This is a very promising direction, which would increase the role of this type of transport not only for Italy, but also for the entire European network.

The part, written by teachers of the Silesian University of Technology (Katowice, Poland), is thematically similar to the previous part. It considers intermodal terminals, one of the modes of transport for which is rail transport. Such terminals are especially important for Poland, which is a key transit country in the implementation of transcontinental traffic on the East–West routes.

²Hofman B (2015) China’s One Belt One Road Initiative: What we know thus far. URL: <http://blogs.worldbank.org/eastasiapacific/china-one-belt-one-road-initiative-what-we-know-thus-far>.

One of the important transport arteries of Europe is the Danube River. It connects many countries of Central and Southern Europe. It can also serve as a potentially important corridor for intermodal transport. Unfortunately, the possibilities of such shipments are so far not fully utilized. The joint work of Bulgarian and Polish scientists is considering the prospects for the development of such transportation.

The following three parts, written by Polish and Italian scientists, are devoted to the problems of urban transport. In particular, the Silesian agglomeration is the most populated region of Poland and one of the largest megacities of Europe. But it also carries many problems associated with the organization and sustainable operation of transport systems. The specificity of this region was a certain disunity of neighboring cities. Combining these cities into one metropolis is the decision of recent years. This is a very promising solution that contributes to the accelerated development of regional and urban transport, but a number of organizational and economic problems are also associated with these problems, which are discussed in the proposed monograph. The authors of this part, who represent the University of Economics in Katowice, were the initiators of the union of the Silesian agglomeration into a megalopolis.

One of the possible solutions is the use of circular traffic at street intersections, and, in particular, the organization of mini-roundabouts. This proposal of scientists from the University of Pisa has already been successfully used in several cities of the Silesian metropolis.

Another promising area for the development of urban transport is the use of intelligent transport systems. Their use for some tram and bus routes has been considered in the proposed parts of the monograph. This technical solution proposed by scientists of the Silesian University of Technology is already used in Italy. However, certain aspects are a scientific innovation.

This once again underlines the fact that many ideas, as the saying goes, are in the air. However, often the implementation has local features.

The final and most extensive part of the monograph is written by Russian scientists. It addresses the problems of global logistics. Here was developed mathematical and simulation models for selecting parameters of intermodal transport systems. Examples of the use of such models were given. The role of digitization in solving new transport and logistic problems is considered. The influence of economic decisions on the development of transport systems has been studied.

Thus, it is necessary to emphasize the complex nature of the approach to solving rather complex problems of the development of transport systems that use different transport modes and different means of transport. The works of scientists from

different countries complement each other, and a discussion on the prospects for the development of the transport industry takes place on the pages of the monograph.

The editor of this monograph already had experience of interaction with the Springer publishing house. In particular, three monographs were also published in the Studies in Systems, Decision and Control series, which also dealt with transport problems.^{3, 4, 5} The authors consider this monograph as a continuation of research in this industry. Despite the fact that most of the authors are working in the universities, the monograph is directly aimed at solving of essential problems facing logistics and transport in different countries. Some part of the problems was solved, realizing ideas into concrete technical, economic, or organizational solutions. For other problems identified ways for solutions.

The book is written primarily for professionals involved in various problems of cargo deliveries, transport planning, and logistics. Nevertheless, the authors hope that this book may be useful for manufacturers, for the technical staff of logistics companies, for managers, for students of transport specialties, as well as for a wide range of readers, who are interested in the current state of transport in different countries.

Katowice, Poland

Aleksander Sładkowski

³Sładkowski A, Pamuła W (eds.) (2015) Intelligent Transportation Systems—Problems and Perspectives. Studies in Systems, Decision and Control 32. Cham, Heidelberg, New York, Dordrecht, London: Springer. 316 p. ISBN 978-3-319-19149-2.

⁴Sładkowski A (ed.) (2017) Rail transport—systems approach. Studies in Systems, Decision and Control 87. Cham: Springer. 456 p. ISBN 978-3-319-51502-1.

⁵Sładkowski A (ed.) (2018) Transport systems and delivery of cargo on East–West routes. Studies in Systems, Decision and Control 155. Cham: Springer. 431 p. ISBN 978-3-319-78294-2.

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