Lecture Notes in Intelligent Transportation and Infrastructure Series Editor[.] Janusz Kacprzyk

Aleksander Sładkowski Editor

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



Aleksander Sładkowski Editor

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



Editor Aleksander Sładkowski Silesian University of Technology Katowice, Poland

ISSN 2523-3440ISSN 2523-3459 (electronic)Lecture Notes in Intelligent Transportation and InfrastructureISBN 978-3-030-11511-1ISBN 978-3-030-11512-8 (eBook)https://doi.org/10.1007/978-3-030-11512-8

Library of Congress Control Number: 2018966858

© Springer Nature Switzerland AG 2020

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Contents

| Methodology for Multi-criteria Selection of TransportationTechnology in Transport NetworkSvetla Stoilova | 1 |
|--|-----|
| Shaping Quality of Service in Freight Transport | 105 |
| Application of Artificial Neural Networks for Short-Term Forecasting of Container Flows in Kazakhstan | 131 |
| Measuring Performances of Multi-mode Marshalling Yards Marco Antognoli, Riccardo Licciardello, Stefano Ricci and Eros Tombesi | 159 |
| Intermodal Terminals Network Modelling | 185 |
| The Danube River, Multimodality and Intermodality | 233 |
| Key Instruments of Sustainable Urban Mobility on the Example of the Silesian Metropolis | 289 |
| Mini-roundabouts for Improving Urban Accessibility Antonio Pratelli, Marino Lupi, Chiara Pratelli and Alessandro Farina | 333 |

| Problems of Quality of Public Transportation Systems in Smart | |
|---|-----|
| Cities—Smoothness and Disruptions in Urban Traffic | 383 |
| Grzegorz Karoń and Renata Żochowska | |
| Features of Logistic Terminal Complexes Functioning in the | |
| Transition to the Circular Economy and Digitalization | 415 |
| Irina Makarova, Ksenia Shubenkova, Vadim Mavrin, | |

Eduard Mukhametdinov, Aleksey Boyko, Zlata Almetova

and Vladimir Shepelev

The Danube River, Multimodality and Intermodality

Velizara Pencheva, Asen Asenov, Aleksander Sładkowski, Ivan Georgiev, Ivan Beloev and Kamen Ivanov

Abstract The work deals with the issues related to multimodal and intermodal transport on the Danube River. An analysis of the state of transport has been made, taking into account the European and national transport development policies until 2020 and 2050. The obstacles to the transport of the Danube via the Danube ports have been identified and recommendations have been made for better use of the river, in line with European policy. A scheme is also proposed for selecting a multimodal transport option using the Danube River. The turnover cargo of the Danube ports participating in multimodal and intermodal systems in the Somovit-Silistra region for a period of the last five years has been analyzed. On the basis of the results of the analysis, the load turnover for the next year is predicted by exploring and modeling time series in the classical and ARIMA methods. The results obtained on the proposed methodology, including both methods, indicate that the turnover will increase by 4.4% over the projected period. This is a good

e-mail: vpencheva@uni-ruse.bg

A. Asenov e-mail: asasenov@uni-ruse.bg

I. Beloev e-mail: ibeloev@uni-ruse.bg

K. Ivanov e-mail: kamen.ivanov@marad.bg

A. Sładkowski

I. Georgiev

© Springer Nature Switzerland AG 2020

V. Pencheva (🖂) · A. Asenov · I. Beloev · K. Ivanov

Faculty of Transport, Transport Department, University of Ruse, Studentska 8, 7017 Ruse, Bulgaria

Faculty of Transport, Department of Logistics and Transport Technologies, Silesian University of Technology, Krasińskiego 8, 40-019 Katowice, Poland e-mail: aleksander.sladkowski@polsl.pl

Faculty of Natural Sciences and Education, Department Applied Mathematics and Statistics, University of Ruse, Studentska 8, 7017 Ruse, Bulgaria e-mail: irgeorgiev@uni-ruse.bg

A. Sładkowski (ed.), *Modelling of the Interaction of the Different Vehicles and Various Transport Modes*, Lecture Notes in Intelligent Transportation and Infrastructure, https://doi.org/10.1007/978-3-030-11512-8_6