

Aleksander Ślaskowski *Editor*

Modern Trends and Research in Intermodal Transportation

Aleksander Sładkowski
Editor

Modern Trends and Research in Intermodal Transportation

 Springer

Editor

Aleksander Ślaskowski
Faculty of Transport and Aviation
Engineering
Silesian University of Technology
Katowice, Poland

ISSN 2198-4182

ISSN 2198-4190 (electronic)

Studies in Systems, Decision and Control

ISBN 978-3-030-87119-2

ISBN 978-3-030-87120-8 (eBook)

<https://doi.org/10.1007/978-3-030-87120-8>

© The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Switzerland AG 2022

This work is subject to copyright. All rights are solely and exclusively licensed 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, expressed 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

Modelling and Simulation for Intermodal Transportation in Logistics Chains	1
Eugen Rosca, Aura Rusca, Mihaela Popa, Florin Rusca, and Sergiu Olteanu	
Current Issues of Multimodal and Intermodal Cargo Transportation	51
Velizara Pencheva, Asen Asenov, Aleksander Sladkowski, Boril Ivanov, and Ivan Georgiev	
Intermodal Transport on Selected Continents	125
Leszek Mindur and Maciej Mindur	
Improving the Efficiency of Transportation and Distribution of Goods in Modern Conditions	197
Zhanarys Raimbekov, Aleksandr Śladkowski, Bakyt Syzdykbayeva, Tolkyn Azatbek, and Kunduz Sharipbekova	
Multimodal Transit, Demographic Segmentation, and Station Proximity Analysis	277
Joseph M. Pogodzinski and John S. Niles	
Challenges for Intermodal Transport in the Twenty-First Century: Reduction of Environmental Impact Due the Integration of Green Transport Modes	307
Kristina Čižiūnienė, Gintautas Bureika, and Jonas Matijošius	
Modern Maintenance of Railway Rolling Stock in the Frame of the European Regulations—From Preventive to Proactive Maintenance	355
Wolfgang Roesch	
Movement of Cargo, Logistics, Data, Data Analytics and Databases	381
John Elgy, Rapahel Kling-David, Phil Mortimer, and Marin Marinov	

Present and Future of Rail Freight: Problems and Challenges	405
Riccardo Licciardello and Stefano Ricci	
Multi-criteria Assessment of Piggyback Systems in Sustainable Supply Chains	451
Nikita Osintsev, Aleksandr Tsyganov, Aleksandr Rakhmangulov, and Aleksander Sładkowski	

Multi-criteria Assessment of Piggyback Systems in Sustainable Supply Chains

Nikita Osintsev, Aleksandr Tsyganov, Aleksandr Rakhmangulov,
and Aleksander Śladkowski

Abstract Achieving the goals of the concept of sustainable development is a priority in improving transport systems. Multimodal and intermodal technologies in local and global supply chains are an effective tool for implementing the concept of sustainable development in transport and logistics. On the other hand, such a solution increases the complexity of managing the transportation process, which is a limitation of the use of this intermodal technology. This is primarily due to the variety of piggyback systems used in different countries. In addition, there is insufficient consideration of the interests of various supply chain's stakeholders in the process of choosing a piggyback system for a specific region, as well as in planning a transportation route. To solve the problem of sustainable development of supply chains through intermodal transportation, the authors analyzed all known piggyback systems and proposed an original system of parameters for their comprehensive assessment. We developed a multi-criteria model for assessing and choosing a piggyback system using the combined DEMATEL-MARCOS method, as well as a methodology for applying this model and method. A numerical example of ranking and selection of well-known piggyback systems is presented, both based on the objective opinion of academic experts and considering the interests of three stakeholders: suppliers, carriers, and infrastructure owners. The results of the ranking of piggyback systems obtained in the study are proposed to be used to design sustainable supply chains. The authors recommend the developed methodology to the owners of infrastructure and carriers for the formation of sustainable supply chains based on the creation and use of piggyback systems.

N. Osintsev · A. Tsyganov · A. Rakhmangulov (✉)

Department of Logistics and Transportation System Management, Nosov Magnitogorsk State Technical University, Lenin av. 38, 455000 Magnitogorsk, Russia

e-mail: ran@magtu.ru

N. Osintsev

e-mail: osintsev@magtu.ru

A. Śladkowski

Faculty of Transport, Department of Logistics and Aviation Technologies, Silesian University of Technology, Krasinskiego 8, 40-019 Katowice, Poland

e-mail: aleksander.sladkowski@polsl.pl