

Optimization of Consolidated Shipping in Cross-Border E-Commerce Logistics

Berk Artuner

International Road Freight - Operations Unit Manager
Emaar Square Mall, Ünalán District, Libadiye Street, No:82-F, 15th Floor, Üsküdar – İstanbul
berk.artuner@borusan.com

Dilay Çelebi

Professor
South-east European Research Centre
CITY College, University of York Europe Campus
24 Proxenou Koromila, Thessaloniki, Greece
dgonidis@seerc.org

Özgül Demir

International Road Freight – Partner Network Manager
Emaar Square Mall, Ünalán District, Libadiye Street, No:82-F, 15th Floor, Üsküdar – İstanbul
ozgul.demir@borusan.com

İlker Baltacı

International Road Freight – Process Development & Business Analysis Manager
Emaar Square Mall, Ünalán District, Libadiye Street, No:82-F, 15th Floor, Üsküdar – İstanbul
ilker.baltaci@borusan.com

Abstract

This study is motivated by the optimal shipment problem of B-yol, an international 3PL company that specializes in cross-border ecommerce (CBeC) logistics outsourcing services. Traditional third-party logistics (3PL) cannot keep up with rapid development and requirements of CBeC. B-yol collects outbound shipments from shippers and consolidates shipments in its cargo terminals. The consolidated shipments are subsequently shipped to international warehouses of e-retailers, for subsequent delivery throughout Europe. In the volatile ecommerce markets, the 3PL has to adjust its traditional freight consolidation strategies to simultaneously meet service commitments and minimize transportation cost. Stochastic arrival times of shipment orders makes the situation even more challenging. Therefore, in this study we develop a model to optimize total cost for the company, which consolidates loads from various cross-border ecommerce shippers at its facility. The model's output is the optimal timing of the shipment, namely how long should shipment orders be held and how much should be consolidated before a shipment is sent. Shipment orders stochastically arrive and wait to be served, incurring a discount cost for waiting. We model this problem as a discrete-time Markov Decision Process, defined over a finite horizon. Using the monotonic properties of the optimal cost function, we developed a simulation algorithm to determine optimal consolidation strategies for the batch service of CBeC customers. Finally, we conducted numerical experiments to observe the results of the proposed approach under various parameter value scenarios.

Keywords

Cross-border ecommerce (CBeC), consolidation, optimization, dynamic programming, simulation.

Acknowledgements

This study is supported by Borusan Logistics as a part of the project titled: “Improvement of Export Processes of SMEs by an innovative e-export platform”

Biographies

Berk Artuner is a unit manager at Borusan Logistics’ International Road Transportation Department. He is mainly focusing on B-Yol, a web portal for Amazon sellers. His bachelor’s degree is in International Relations of Kocaeli University. He had gained experiences on; customer service management, road transportation operation management, project leading and key account management subjects through his 15 years of logistics career. He has been working for Borusan Logistics since October 2021.

Dilay Celebi is a senior researcher at the South East European Research Center (SEERC) and a professor in CITY College, University of York Europe Campus. Her research interests include logistics, supply chain management, transportation, and operations planning and modelling. Her bachelor degree is in Industrial Engineering of Middle East Technical University, and her PhD from Management Engineering of Istanbul Technical University. She worked as a leading consultant to various international organizations, including International Transport Forum at OECD and The World Bank, as well as private companies, public authorities and government institutions in support of their operations planning and policy actions of production, transport and logistics.

Özgül Demir is the Partner Network Manager at Borusan Logistics’ International Road Transportation Department. Her bachelor’s degree is in Science Politics and Administrative Affairs of Marmara University. She had gained experiences on international road operations, partner network management, customer excellence, key account management and digitalization subjects through her 18 years of logistics career. She has been working for Borusan Logistics since 2011.

İlker Baltacı is a Process Development & Business Analysis Manager at Borusan Logistics’ International Road Transportation Department. His bachelor’s degree is in International Trade Management of Bogazici University and his master's degree is in engineering management of Bahcesehir University. He gained experience in project management, lean 6 sigma, agile, digital transformation, R&D processes, financial analysis, and all international transportation operations such as road, air, sea, warehouses, and fleet management subjects through his 11 years of logistics career. He has been working for Borusan Logistics since 2012.