

# **Cross Docking Network with Multiple Types of Trucks**

**Takashi Irohara**

Department of Information and Communication Sciences

Sophia University

Chiyoda-ku, Tokyo 102-8554, JAPAN

[aali@ltu.edu](mailto:aali@ltu.edu), [dreimer@ltu.edu](mailto:dreimer@ltu.edu)

## **Abstract**

In this research, a distribution network that trucks transport various products including perishable foods from some suppliers to some stores are considered. In this distribution network, there are multiple cross docking centers. Cross docking is a logistic management strategy in which products delivered by inbound trucks from suppliers are immediately loaded to outbound trucks to stores in same day. Because products are not stored for a long term in cross docking center, cross docking center can save operation cost, reduce inventory space, shorten delivery lead time from supplier to store and avoid loss of sales opportunities due to deterioration of food etc. A distribution network that has multiple cross docking centers is called the cross docking network. This research considers effective truck transportation among cross docking centers in cross docking network. The main difference from the previous truck scheduling paper of cross docking network is that this research selects truck type considering temperature control zone (Normal, Chilled and Frozen) of the products to be transported. We propose a Mixed Integer Programming (MIP) with an objective function which is to minimize total transportation cost among cross docking centers. And this research decides truck type, truck size, destination, quantity of loaded product and departure time to cross docking center. We show numerical experiment results using real data transported among cross docking centers and discuss the difference between the current and proposed transportation.

## **Keywords (12 font)**

Logistics, Operations Research, Optimization, Cross Docking Network, Truck Scheduling.

## **Biography**

**Takashi Irohara** received the B.E., M.E., and Doctor of Engineering degrees from Waseda University, Japan, in 1993, 1995, and 1998, respectively. Since 2010, he has been working as a professor at the Department of Information and Communication Sciences, Faculty of Science and Technology, Sophia University, Japan. He has published over 60 reviewed journal papers in the area of facility logistics (order picking, inbound/outbound truck scheduling in the warehouse, facility layout problem, material handling), supply chain management (inventory control, transportation, and vehicle routing problem), production scheduling and humanitarian relief logistics. He served as a board member of Japan Industrial Management Association, Scheduling Society of Japan, Japanese Material Handling Society and APIEMS (Asia Pacific Industrial Engineering and Management Systems Conference).