



13th International Conference on Industrial
Engineering and Industrial Management

XXIII Congreso de Ingeniería de Organización

A large, abstract concrete sculpture with a central archway, set against a blue sky and green ground. The sculpture is made of dark, weathered concrete and has a curved, modern design.

Organizational Engineering in Industry 4.0

BOOK OF ABSTRACTS

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Multi-period Capacitated Intermodal Network Design with Allocation of Investment Budget

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Keywords: Network design; Strategic-tactical planning; Capacity planning; Investment budget; Multi-period formulation.

1 Introduction

Designing a transport network implies joint strategic and tactical planning decisions to obtain the optimum number of facilities and specific network arcs that minimise costs and satisfy demands (Rahimi et al., 2008). Financial limitations influence network design decisions (Harris, 2014). Extensive capital investment is required to implement projects of this type, however, the capital is not always available when planning is first undertaken (Fotuhi and Huynh, 2018). Additionally, to invest in these types of projects, investors have to take into account non-operational time while the facility is being built and balance the trade-off with maintenance and other costs (Wiegmans and Behdani, 2018).

2 Objectives

The objective is optimising the cost of using and maintaining a capacitated intermodal network design for an agricultural area that requires improved access and connections to national transport networks to satisfy long-term demand. Strategic decisions define where and when facility location and capacity and new transport infrastructure are chosen. Tactical decisions define the allocation of network flows and the identification of physical routes by transport mode (single mode or intermodal).

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3 Methods

The problem studied in this paper refers to a real situation in an agricultural area in a developing country where it is difficult to transport agricultural products. Multi-period mixed-integer linear programming formulation for capacitated intermodal network design with investment planning is proposed. Decisions are limited by the available per period investment budget according to each type of infrastructure, and alternative sets are defined for the installation of the intermodal logistics platforms and new arcs into account non-operational time while the facility is being built.

4 Results

We are currently coding the model with Gurobi v8.1 R Interface and collecting data to generate a set of instances that will allow us to assess computational performance. However, it is difficult to obtain real costs due to a lack of records of standard transport mode rates and the absence of logistics operators in the area.

5 Conclusion

Even though this model has been motivated by accessibility problems in a specific agricultural area, it could be adapted to other contexts that require the design of a raw materials intermodal network or investment in the intermodal network's supply network. Future work will focus on stochastic approach or formulate the model with multi-criteria objectives as a way to assess the impact on territorial development.

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