

## Chapter 12

# Decision Support System Design Requirements, Information Management, and Urban Logistics Efficiency: Case Study of Bogotá, Colombia

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### ABSTRACT

*The aim of this chapter is to define the requirements for the design of a Decision Support System (DSS), in order to address the problems associated with loading and unloading of goods operations in Bogotá, Colombia. The requirements definition is based on information obtained from the project “Formulación de alternativas para el cargue y descargue de mercancías en Bogotá” developed by the Universidad Nacional de Colombia. We present a literature review concerning with the relevance of developments and application of this kind of systems in cities such as Bogotá, regarded by some authors as a megacity in Latin America. The definition of the design requirements of the system is rooted in the identified needs of the stakeholders involved in urban logistics operations with the aim of encompassing and providing reliable information that favors the design of a DSS adapted to identified conditions.*

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## INTRODUCTION

Urban logistics, i.e. the set of distribution logistics and goods transport activities in the perimeter of an urban area, has become a popular subject of research and practice field, mainly since 2000 (Taniguchi et al., 2001; Macharis & Melo, 2011; Gonzalez-Feliu et al., 2014a; Taniguchi & Thompson, 2015). One of the main objectives of urban (or city) logistics is to reduce the environmental nuisances of the distribution logistics and freight transport activities. To do this, Gonzalez-Feliu (2008) preconizes six types of actions:

- **Infrastructures:** Two types of infrastructural actions can be deployed: that of implementing and/or improving linear infrastructures (i.e. roads, highways, railways and fluvial lines, among others) or nodal (logistics platforms and urban logistics spaces).
- **Organizational Actions:** This item includes the main design, planning, and optimisation steps for the new or improved logistics chain. They allow the definition of the main organisational strategies.
- **Technologies:** In general, two types of technologies are used. Information and communication technologies (ICTs) promote the exchange of information, vehicle and goods tracking, and other transport support operations. Vehicle technologies, specifically those related to engines, lead to reductions in pollutant emissions and help improve air quality.
- **Communications:** This item refers to processes and means for communicating with potential users of the system, as well as other stakeholders directly or indirectly involved in the urban logistics system.
- **Funding:** For most urban logistics systems, private funds alone are not sufficient to cover the costs of implementing different schemes or promoting more green logistics practices. Public subsidies and low-cost recycling of existing facilities are the most common forms of assistance when launching an urban logistics project. Operational costs can sometimes be covered by revenue, notably in cases where the system manager is also the facility owner.
- **Regulations:** Public authorities introduce legislation or other regulations to promote the use of the delivery consolidation system they desire. These regulations can be restrictive, inciting or advantage-based.

Focusing on technologies, and in the open data era, challenges on the deployment of information technologies and systems are now being observed. Moreover, the different stakeholders involved in urban logistics need a better coordination and collaboration to combine all the six types of actions in a more efficient “system of practices”. In this context, the role of ICT and information systems is crucial, since, if well-defined, they can be very helpful for collaboration (Gonzalez-Feliu & Morana, 2011). From those ICT, decision support systems seem to have an important role in city logistics, but their deployment (system) are strongly conditioned by the stakeholders’ needs and implications.

This chapter is framed in the development of design guidelines for loading and unloading operation management, focused in the basis of area of information systems used in loading and unloading of goods operations in Bogotá. The chapter is organized as follows. First, the background of the research is presented, mainly on the basis of a literature review of the use of information systems in logistics operations. Then, the case study of Bogotá city is presented, as well as the different stakeholders involved in urban logistics innovation deployment. After that, we will present in detail the purpose of the alternative

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