INFORMATIONAL FLOWS IN URBAN FREIGHT DISTRIBUTION

Mihaela STET,
West University "Vasile Goldis" Arad – subsidiary Baia Mare

Key words: informational, flows, urban, freight, distribution

ABSTRACT: The complexity of freight distribution process involves the transfer of a large amount of information between the actors in distribution channel, which supposes the development of an evolved informational system.

The problem of establishment the best solutions in urban freight distribution is, first of all, a problem of administration the informational flows between the participants involved in: wholesalers, carriers, retailers and municipalities. This has generated, based on evolvement of high technologies, the introduction and development of the informational and communication systems, as an essential condition for urban distribution optimization.

1. INTRODUCTION

Distribution of freight in urban spaces is not a new problem, being known preoccupies for this even from the antique period. What makes particular this type of distribution is derived actually from the distribution environment: a particular configuration of urbanism plan, many buildings, more and less narrow streets, increasing demographic concentration, growing mobility, many vehicles, and reduced number of parking and loading/unloading spaces for goods. What makes difficult the freight deliveries are the reduced storage spaces at retail outlets, weight access constraints in urban spaces, circulation of freight delivery vehicles during the peak hours.

Distribution process is associated with three types of flows: material, informational and financial flows. It can be said, opposite to general perception, that informational, not freight flows, are the first types of flows involved in distribution of goods. Whether the role of information in initial phase of distribution is so old like the distribution itself, the role of continuous information exchange is becoming more and more obvious. And regards to urban distribution, the information role is more striking.

Why this field of information is so important for researchers? Probably because in this economical exchanging environment, the information structure becomes, at least, so important likes infrastructure. Distribution companies need continuous and updated information about the delivery process in order to respond quickly to customers needs [2]. It can be talking today, therefore, about an info-structure of distribution, beside the classical needed infrastructure.

2. URBAN AGGLOMERATION, JUNCTION SPACE OF FREIGHT DISTRIBUTION FLOWS

The information flows start, in freight distribution, from the customers which initiate the order. Since this moment, there are generating continuous exchange information between the different levels and participants at distribution process (fig.1). Essentially there are the following categories of participants: freight distribution centers operators, distributors, transport operators, administrations, and retailers.

The management of freight and information throughout the total supply chain from the original raw material source to the consumer of finished products, encompassing factories,

assembly and packing plants, warehouses, distribution centers and retail outlets represents a way and a condition to grow the efficiency in distribution activities. But, the large range of actors involved in urban freight distribution, like as producers, shippers, freight carriers may have possibly conflicting goals.

The initiator of delivery orders could be, in urban space a retailer, an outlet, being possible to talk, in the same time, about large stores, as supermarkets or small proximity shops. On the other hand, if it is taken in account home delivery, the order initiator will be the final client. This starts the entire process of information exchange that constitutes the base of freight exchange.

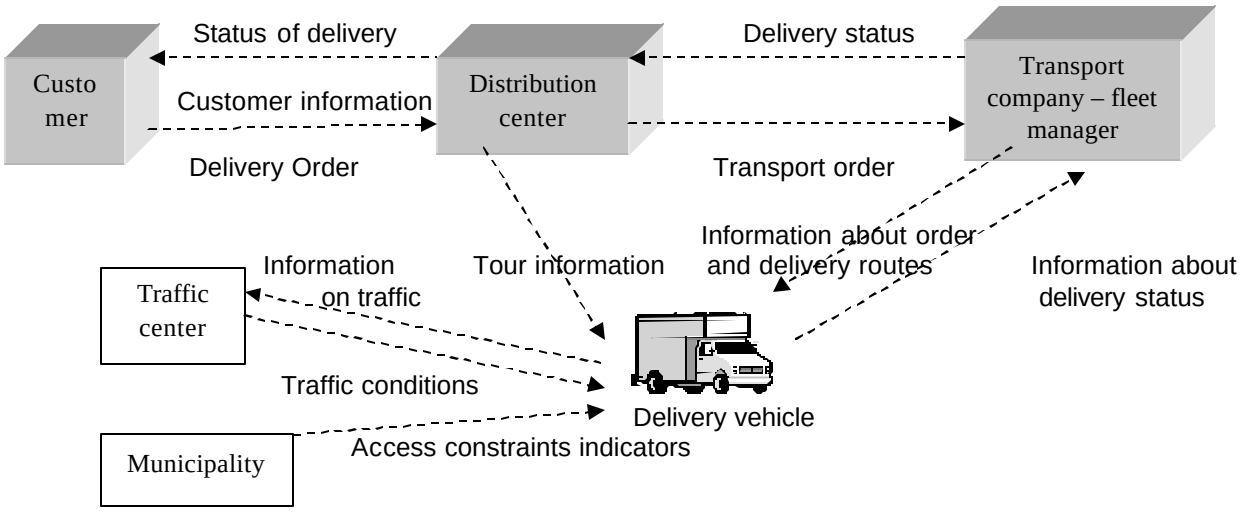

Figure 1 Information Flows in Urban Freight Distribution

The basic components of information flows, which facilitate the integration of related logistics activities, include information on sales and delivery and information about inputs and output flows, such as materials, order placement. In what it concerns the information about customer referred in figure1, this comprises the points of delivery, their addresses, delivery time windows, order data and goods, including weight, loading and delivery relations, volume, the level of priority for delivery. In addition, the fleet manager, at the transport management center gives to drivers, information about optimal routes. With the information from the forwarder, the fleet manager establishes the drivers and contacts them, transforming this information in specific information for drivers. From this moment it is beginning an information exchange between transport center and the drivers, which inform about the vehicle location and status of deliveries. The information changes whilst vehicles are distributing goods and a sequential updating of routes should occur when new information is received. Information about system performance includes travel times, service times, waiting times.

To become information with added value, it isn't enough only the information exchange between them involved in distribution, being necessary the processing filtering and appropriate aggregation of them.

Modifies in logistics organizing are possible by the development of information and communication, which allow the tracking and identification of shipments and components and a continuous communication data exchanges, in real time between the different partners in logistics chain.

For improvement of their performance many companies must to take decisions in buying or developing the information systems necessary to control the processes in their supply chain. The efficient and effective operation of the logistics system depends on reliable and timely information flows, involving all the actors involved in distribution. A barrier in implementing and extension of such a type of system consists in the high costs of communications means and the expensive needed equipment. Much more, the information system in distribution is composed from different subsystems, being a difficult task to coordinate the entire process of information transfer, feedback from different subsystems to create and to take the most proper decision.

To exchange continuous information about distribution process are necessary standardization models for information flows, applications and communication infrastructures. Major risings of logistics efficiency could be realized as a result of progress in information technology. Improved information technology and practical applications of logistics are helping to optimize journey patterns, reduce empty running.

The development of information technology and information systems has made it possible to integrate the supply chain so that the links between suppliers, producers, customers and third parties have been easier to establish. By establishing these links, effective support for the functioning of a logistics chain can be needed.

Introduction of integrated collaborative planning systems in which are involved producers, retailers and logistic service providers that share information of production, sales and logistics could improve the distribution of goods. The most important benefits of logistics information system consist in supply of a real time process modeling, critical situations forecast, and a dynamic process monitoring.

Efficient information exchange is the most essential requirement for implementing the collaborative practices, to streamline the store replenishment process. Tracking a product along the supply chain on real-time basis, even within a retail outlet, will enable suppliers to effectively manage replenishment, have better forecasting accuracy. The capability to know on a real-time basis the current stock level at the warehouse or the outlet's shelf could determine the elimination of out-of-stock situations. Whether in the past, the logistical systems had focused on stored freights, on warehoused inventories, as results of electronic technologies by last generation, which manage the information flows, by connecting logistics is focused, more and more, on the management of in transit inventories [1].

To identify and track the logistical units on the entire distribution chain: producer-shipper-transporter-customer could be used electronic labels using identification serial code. This system offers information about the goods of shipments, contained products, information about the delivery lot, its location. In addition, the transporter can found information about destination, special transport conditions and other information necessary for efficient routing.

Track and trace systems, using bar coding or RFID technology, provide information on the location of specific consignments between dispatcher and receiver, useful for monitoring delivery performance and responding to inquiries about late or missing deliveries. RFID technologies offer a series of advantages face to classical identification systems: capacity of distance reading, without any contact packed, enhanced visibility on the entire distribution channel. By use and integrating RFID infrastructure it is possible to accurately and automatically monitor which products arrive and exit a distribution center or a retail outlet.

In a first stage EDI (Electronic Data Interchange) was a practical solution to exchange order, invoicing and payment information, but today Internet-based approaches are providing firms with new mechanisms to interact with customers and suppliers. Introduction of Internet

make it easier to share information among supply chain partners. In the future, the increasing use of intelligent transportation systems such as global positioning system for vehicle tracking will be a common tool in distribution of goods.

In what it concerns the freight transportation in urban areas and its relation with shippers and receivers, it is necessary to develop and apply techniques of data exchanging and service centers management. A key goal is to reduce pick-up and delivery traffic demand in urban areas by optimized tour and route planning, as well as by intelligent notification services and hence improved delivery rates.

Fleet management system needs to identify in real time the positions of each vehicle and its operational conditions: type of load, available capacity. Dynamic fleet management systems offer the opportunity of freight carriers' operators to be able to respond to change in demand, driver and vehicle availability, changes in traffic network condition. New challenges for the transportation resulted from the major changes affecting logistical processes in trade and commerce: just in time replenishment of goods in retails.

New kinds of technological elements are involved, such as: vehicle location assessment technology, on-board transmission, processing, and information analysis technology. ITS represents a key solution for goods movement and could have an increasing role in urban goods movement. Some ITS applications that relate to urban goods movement include telematics, trucking communication, GPS/satellite positioning and real time traffic data, transponders, cell phones, AVM (automated vehicle monitoring), scheduling and much more. The main measures on telematics can be aggregated in: traffic information, freight capacity exchange system, route optimization services, vehicle maintenance management system, others information services through internet access, centralized route planning. Once the fleet is equipped and linked to the dispatchers' computers and company's data processing and storage infrastructure an important volume of data becomes available for immediate decisions and background analysis and planning activity. The use of wireless distribution network allow two-way data communications by GPRS, monitoring certain information in real-time, informing the clients about the delivery status in real time using mobile network, real time collection of performance data (working hours, on time deliveries). More recent studies are oriented on information systems that use floating car data, known as IP Car System.

In optimization of freight distribution processes at urban level it is necessary to find a coordinator that can design solutions for integrated logistics problems. It is necessary to involve both private and public parts for sustainable solution in urban areas. To manage efficiently the freight distribution process in large urban agglomerations are necessary more and more real time information. For this reason, it has to implement real time information generators to offer information about real time traffic conditions and real time supply and demand information. The logistics services involved in distribution requires specific systems for activities such as vehicle routing and scheduling, track and trace, warehouse management, generation of performance reports, and processing of payments.

Local authorities, metropolitan planning organizations, transportation planners, and researchers need to intervene and to find solutions, experiment management tools of station and circulation, by organizing delivery zones in city centers and optimization delivery routes, using dynamical systems for road information at a service center. Information provided by variable displays, about urban traffic including even so data about parking, allows dynamic guidance of routes.

For example, use of traffic management system allows identifying, in real time, the position of every fleet's vehicle and the operational conditions, such as load type or available

capacity. This could determine vehicles scheduling and an optimal routing. The dynamic traffic simulation models correspond to the actual traffic conditions, providing at each time interval the estimates of current travel times, queues on each link on the road network. As result, the increasing availability of transmission information system provides a new temporal information dimension.

From the distribution companies' point of view, the operations control systems ascertain the locations and destinations of vehicles and loads, vehicle travel status offer the possibility for operations plans, guidance to drivers and other applications. For dynamic goods and delivery management, the various transport and logistics systems to be used require continuously updated information and forecast concerning traffic congestion, road status of tour, or the availability of the receiver.

Information system utilized by parties in a logistics chain and information flows between them determine also the reduction of uncertainty. An important problem which it is necessary to be taken in account it is to eliminate the redundant information in logistics chain [3]. Use of a centralized solution with a database linking all the actors involved determines the minimization information exchange between them.

On the other hand, identifying the bottlenecks in the information exchange and treating them are challenging problems in freight distribution in urban spaces. To react rapidly to new customer requests, the ability to estimate truck volumes and flows become essential objectives for a series of applications in freight distribution networks.

3. CONCLUSIONS

In distribution system there are a large number of actors, including sender, the recipient, the logistics company, fleet operator, whose various requirements must be taken in account. Using modeling processes, interactions and information flows between the actors can be represented and visualized.

In today exchanging business environment, where value of information rising from a day to another, information networks creation becomes a stringent necessity. The companies are coordinating their distribution channel with the help of information, the activities in freight distribution being heavily dependent on reliable and timely information flows. For this reason, use of information technology is considered an imperative requirement for managing urban distribution network, for running the logistics cross-organizational process.

REFERENCES

[1] Basu, M.; Siems T. F. (2004). The Impact of E-Business Technologies on Supply Chain Operations: A Macroeconomic Perspective, *Research Department, Working Paper*, Dallas

[2] Gruhn, V.; Hulder, M.; Ijioui, R.; Schope, L. (2003) – A Distributed Communication System for Integration with Logistics Software**,** Leipzig, Germany

[3] Hultén, L.; Boltin, H. (2002). Information Exchange and Controllability in Logistics, Sweden