Innovation in Transport Logistics—Best Practices from the EU Project LOGINN

David Ciprés, Lorena Polo and Alberto Capella

Abstract Innovation has historically played a vital role in increasing efficiency. However, while other industry sectors have experienced rapid growth of productivity, the transport logistics industry has seen relatively small improvement in terms of efficiency. The European LOGINN project undertakes several activities aiming at fostering collaboration among the involved stakeholders of the logistics domain regarding the promotion of innovative transport logistics solutions. The LOGINN approach for supporting logistics innovation achievement involves three interlinked and mutually reinforcing dimensions: innovative business models within the supply chain, innovative logistics best practices, and innovative technologies. In this work, we describe a methodology for innovative best practices identification and we present a selection of best practices identified from the LOGINN project in the areas of e-freight, co-modality, urban freight distribution, and intralogistics.

Keywords Innovation · Best practice · Transport · Logistics

Introduction

The transport logistics network in Europe represents the aorta of the European economy. The importance of the sector for the EU market has been recognized by the Commission in the White Paper on Transport (six countries out of the global top-10 logistic performers are from the EU in 2012). However, high fuel prices, the

D. Ciprés (✉) · L. Polo · A. Capella
Aragon Institute of Technology (ITAINNOVA), C/María de Luna 7,
50018 Saragossa, Spain
e-mail: dcipres@itainnova.es

L. Polo
e-mail: lpolo@itainnova.es

A. Capella
e-mail: acapella@itainnova.es

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need for sustainability, more service, and costs requirements, represent new challenges that require constant innovation.

Innovation in transport logistics can be defined, as an extension to the established "logistics" definition provided by the Council of Supply Chain Management Professionals, as: "the implementation of a new or significantly improved organizational method (business model), process (logistics practice) or technological application within the context of planning, implementing, and controlling procedures for the efficient and effective transportation and storage of goods including services, and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements." Innovation has historically played a vital role in increasing efficiency (e.g., the containerization of the industry), and numerous further innovations are needed to nurture intermodality and co-modality, as road transport continues to grow (Behrends 2009).

While other industry sectors have experienced rapid growth of productivity, the transport logistics industry has seen relatively small improvement in terms of efficiency. One large factor behind this is the lack of interest in innovation in freight transport, compared to other sectors. Research shows that other industry sectors spend from 4.8 to 17.8 % of their turnover on research and innovation, compared to only 1.1 % for the transport industry (Wagner 2008). Main reasons for that are:

- the lack of clarity to many supply chain members of where the potential for improvement lies and what type of innovations can enable operational improvements (Nilsson 2006; Sternberg et al. 2011),
- the large proportion of SMEs within the freight transport and logistics services, combined with the significant challenges faced by SMEs in participating in EU research and innovation programs (as noted in the Green Paper of a Common Strategic Framework for EU Research & Innovation Funding—COM(2011)48).

Besides this scarce investment in innovation, usually existing R&D projects stop with the implementation of a prototype or pilot, and research results do not turn into real innovations. In order to bridge the gap between pilot implantation and marketable solutions, there are some actions that are being funded by European Commission. One of these actions is the Logistic Innovation uptake project (LOGINN project).

The LOGINN European project, started in November 2012, is a collaborative project funded by the European Commission under the Seventh Framework Programme, Theme 7, Sustainable Surface Transport (reference: 314338). It undertakes several activities aiming at fostering collaboration among the involved stakeholders of the logistics domain (industry, SMEs, public authorities, investors, and research organizations) regarding the promotion of innovative transport logistics solutions.

The objective of this contribution is to present a selection of best practices identified from the LOGINN project that support the companies' productivity and competitiveness and boost the cooperation and collaboration in the transport and logistics sector.

The paper is organized as follows. In section "Solution Directions to Foster Transport Logistics Innovation", we present solutions directions from the LOGINN project to foster transport logistics innovation. In section "A Methodological Approach for Best Practices Identification in the Framework of the LOGINN Project", a methodology approach for best practices identification and classification is described. In section "Best Practices", we present an overview of some best practices included in the inventory of best practices developed in the framework of the LOGINN project. Finally, section "Conclusion" shows conclusions and future work.

Solution Directions to Foster Transport Logistics Innovation

The LOGINN approach for supporting logistics innovation achievement involves three interlinked and mutually reinforcing dimensions: innovative business models within the supply chain, innovative logistics best practices, and innovative technologies.

Business Models

Globalization and increased customer demands during the past decades have led transport logistics to assume a series of different business models in order to meet the challenges faced. The business model concept became prevalent in the mid-1990s. The emergence of the Internet played a significant part in that, as it gave companies (and supply chains) the ability to find additional was of creating value for their customers. In the framework of the LOGINN project, we consider the business model as a representation of the way the members of a supply chain use their competencies and resources to increase customer and shareholder value. Thus, innovative logistics business models should consider:

- Innovative ways to reach the customer (e.g., DHL's Bring.Buddy initiative employing crowd sourcing for urban deliveries, etc.),
- Innovative configurations of the supply chain providers (e.g., the migration from the large transport operator to the 3PL and 4PL providers, to the Lead Logistics Provider, and to the flexible networks of smaller 3PL providers, the emergence of virtual supply chains, etc.),
- Innovative supply chain coordination mechanisms (e.g., the evolution from the centralized to distributed monitoring and control provided by the "installation" of knowledge on the cargo itself).

Logistics Practices

A second dimension of logistics innovation is best practices. Best practices can be defined as those practices that:

- Deliver tried-and-tested solutions to known problems (Szulanski 1996),
- Reflect accumulated, reusable patterns and components, tools and platforms (Next Practice Research Institute 2011),
- Provide curricula content, precise techniques, and methodological strategies (Peters and Heron 1993).

From a logistics and innovation perspective, we can define a Best Practice as a solution that uses an innovative approach to improve freight transport sustainability in economic, environmental, or social terms. Some examples of logistic best practices are Collaborative Planning, Forecasting & Replenishment (CPFR), Postponement, Cross-Docking, Quick-Response, logistics-driven packaging, or Vendor Managed Inventory (VMI) (Andraski and Haedicke 2003; Maknoon and Baptiste 2009; Choi and Sethi 2010; Kreng and Chen 2008). An innovative logistics practices inventory can be used as an instrument for the transfer of knowledge throughout the European freight transport industry. The methodology approach and some examples of innovative logistic best practices identified in the LOGINN project are the focus of the following sections.

Innovative Technologies

A third dimension of logistics innovation is innovative technologies, as new technological developments (mainly in terms of ICT) are able to improve overall functionality of freight transportation on European level. It covers a wide spectrum of areas, from information and communication technologies, to engine technologies, to intermodal transshipment and material handling technologies, virtual enterprises management techniques to Internet of Things (Tsai et al. 2010; Sanchez and Perez 2005; Shi et al. 2011).

It is important to remark that, besides the content of each dimension, what is even more important to stress is their mutually reinforcing character. ICT has provided new tools for supply chain actors to introduce new practices and new business models; further stretched ICT boundaries to turn themselves from theory to reality.

In the framework of the LOGINN project, an inventory of innovative logistic business models, best practices, and technologies has been created and uploaded to a collaborative platform (LOGINN Virtual Arena). The objective is to get innovation results to logistics companies, transport operators, stakeholder organizations, and technology providers that are interested in adopting transport logistics innovations.

In the following sections, we focus in logistics practices dimension, and describe the methodological approach used and show some examples of innovative logistic practices.

A Methodological Approach for Best Practices Identification in the Framework of the LOGINN Project

Definition of Best Practices

The identification of a best practice is encouraged for several pragmatic reasons. It identifies the best way of doing something in contrast to an inferior or less effective approach. It prevents people from "having to reinvent the wheel", and it gets more practitioners to use the best way (Duignan 2009). Best practices also can be conceived as a promising or exemplary practice, often recommended by experts or leaders in a field (Peters and Heron 1993). Best practices are intended to help practitioners who wish to improve the quality of their service (Peters and Heron 1993; Edge and Richards 1998). A best practice is also a vehicle, by which research can be translated into a form that meets the needs of practitioners, policy makers, and pre- and in-service training agendas (Szulanski 1996; Peters and Heron 1993).

Classification of Best Practices

Duignan (2009) suggests classifying best practices according to the following categories:

1. A practice which practitioners know is feasible to implement, because they have implemented it.
2. A practice which practitioners think probably improves outcomes (but they are not making a strong high-level outcomes/impact evaluation attribution claim for it).
3. A practice which independent evaluators (or reviewers) of some sort think probably improves outcomes (but they are not making a strong high-level outcomes/impact evaluation attribution claim for it).
4. A practice for which someone has made a strong high-level outcomes/impact attribution claim (i.e., they have claimed that they have proof that the practice improves high-level outcomes).

Selected Areas

In the framework of the LOGINN project, best practices from four areas have been collected: e-freight, co-modality, Urban Freight Distribution (UFD), and intralogistics, as the European Commission has remarked their relevance for the consecution of sustainability in European transport.

In fact, in its White Paper for Transport (March 2011), the European Commission has set e-freight as one of the key initiatives in the quest for a Single European Transport Area supported by a competitive, secure, and sustainable transport system. In this context, the EC is funding research and pilot projects to investigate possible e-freight solutions and their benefits.

The co-modality is a notion introduced by the European commission in 2006 in the field of the transport policy to define an approach of the globality of the transport modes and of their combinations. For the European commission the co-modality refers to a "use of different modes on their own and in combination" in the aim to obtain "an optimal and sustainable utilization of resources."

Urban Transport has been a priority for the EU Commission in 2007. The growing significance of urban freight transport (UFD) and logistics is related to increased population and sustained economic growth in urban areas. The main policy objectives arising from these challenges are for transport and travel to become: cleaner, more efficient, including energy efficient, safer, and more secure (Action Plan for the Deployment of Intelligent Transport Systems in Europe 2008).

"Intralogistics" describes the organization, realization, and optimization of internal material flow and logistic technologies. Energy efficiency issues in intralogistics are becoming increasingly important as they are the most cost-effective ways to enhance security of energy supply, and to reduce emissions of greenhouse gases and other pollutants. The EU Commission has proposed that all Member States establish a national energy saving obligation scheme appropriate for their circumstances.

Basic Resources

Regarding information search, different sources of information and project's databases have been consulted for best practices identification.

As far as public-funded projects are concerned, the basic resources used are CORDIS (Community Research and Development Information Service) at European level. As far as private-funded projects are concerned, projects carried out by leading R&D centers at the European level have been taken into account, as well as projects developed by transport and logistics companies at the regional level.

For the identification and analysis of innovative logistic best practices, almost 100 projects (mostly European ones) have been reviewed. From them, 63 projects have been selected for further analysis and in depth reviewing. They have been

analyzed and they have been considered as a good source for best practices due to features such as:

- Innovative aspects of the projects,
- Contribution to the logistic areas selected,
- Solid partners.

Best Practices

In the framework of the LOGINN project, an inventory of best practices has been developed and disseminated through the platform LOGINN Virtual Arena (http://www.logisticsarena.eu/), which is a platform developed in the LOGINN project in order to become a virtual meeting point for all the value chain actors.

In this contribution, we present a sample of best practices that are fostered in the LOGINN Project in the context of the particular areas selected. It is not the aim to complete the overview of solutions, but to present and show some examples of best practices that have the potential to increase transport logistics efficiency in each of the selected areas.

Interoperability Between E-Freight Systems (E-Freight)

There are many data sources available which will be aggregated: data from container security devices, port communities, logistics networks, terminal operators, etc. In order to support decision processes in the logistics chain, we need to combine data sources and consolidate these data to valuable information. It involves providing connectivity among systems and using common standards.

Based on this interoperable set of e-freight systems, shippers, beneficial cargo owners, LSPs as well as customs authorities will be offered information that will make logistic chains to have shorter lead times and higher reliability. We will unlock valuable information that is available somewhere throughout the logistics chain.

Interoperability between systems is only useful if it leads to improved processes. With this practice, we focus on better integration of customs processes, better interfaces between sea and hinterland, as well as better control on the hinterland part of the logistics chain which is often the largest cause of variability.

Cargo Bicicle Delivery in the 'Last Mile' (Co-modality)

Almost 100 % cargo transport in cities is done by motorized vehicles, ranging from personal cars to commercial delivery vans and trucks (lorries). However, these

heavy vehicles often transport very light goods. A large share of the cargo being moved in and out of cities could be transported by cargo cycles.

Freight traffic takes up a large portion of total daytime road transport in cities, often as high as 50 % in large cities, and up to 90 % in very large cities such as London and Paris. The "last mile" is currently regarded as one of the most expensive, least efficient, and most polluting sections of the entire logistic chain. This is because traffic congestion makes the driving cycle very irregular, leading to very high fuel consumption and a loss of time.

Some positive ecological and social consequences of substituting cargo cycles for delivery vans are: important fuel savings, less pollution, less noise, more space in a more enjoyable city, less congestion, and less serious accidents. There are as many economic benefits as there are ecological and social benefits, though they are not so obvious at first sight.

Cargo cycles operating in the city are as fast as vans and trucks, due to the fact that they are less affected by traffic congestion, because they can often take faster routes where trucks and vans cannot go, such as pedestrian streets, alleys, or bicycle paths. Because cargo cycles are less affected by variable traffic conditions, journey times are more reliable. Moreover, they are able to enter the city 24 h a day, while many Europeans cities have set very strict time windows for loading and unloading of trucks and vans. Cargo cycles have generally no difficulty finding a place to load or unload and can often stop right in front of the door or even enter a building. In addition, cargo cycles are much cheaper than vans.

Traffic Forecasting for Congestion Reduction (UFD)

Transport congestion problems contribute 70 % of pollutants to urban environments. The transport sector by itself consumes up to 30 % of the total energy in the EU. These figures suggest that if Europe is to reduce its CO_2 emissions by making an efficient use of energy while improving the quality of life in European cities, novel approaches for the optimal management of urban transport complexity must be developed and adopted in the transport sector.

Congestion is one of the most significant contributors to air pollution and can have devastating effects on the environment as well as individuals. Congestion usually occurs repeatedly in specific areas. According to a study published on PubMed.gov, this will cause increased pollution concentrations in those specific areas. Besides, during congestion, vehicles burn gasoline for large periods of time without traveling far. According to the Environmental Protection Agency, this is a waste of energy and increases the need for more gasoline.

With traffic forecasting practices, drivers can avoid congestion areas and changes in traffic organization can be made in order to reduce pollution zones.

Plant Floor Visibility (Intralogistics)

A lack of near-real-time visibility across all ends of production leads to fragmented communication and delayed response to production-critical issues.

Operations managers require access to near-real-time information on disparate intralogistic processes. Making timely decisions can prevent lag time and help managers address lapses in performance, address equipment downtime, identify additional resources requirements, and quickly identify areas that require operational improvements.

With this purpose, it is necessary to gather, analyze, and respond to vast amounts of production-related data in a short time. In order to make this in an agile way, it is mandatory to maximize visibility of processes across each end of the production spectrum, enabling managers to participate in operational decision-making.

Advanced technologies facilitate visibility on processes. Mobile connectivity can ensure that data is available anytime, anywhere for faster, more intelligent decision-making that can help manufacturers and distributors gain a competitive edge.

Conclusion

This contribution describes a methodology for the identification and classification of innovative logistics best practices in the framework of the European project LOGINN, as well as a first rough analysis of drivers and barriers of each practice.

The scope of the best practices selection is limited to four areas such as co-modality, urban freight distribution, e-freight, and intralogistics as they constitute a priority for European Commission. A sample of four best practices, one of each selected area, has been identified and described in depth.

Future work focus will be to identify knowledge on what the drivers for successful logistics innovations are and how the barriers to innovation adoption can be mitigated and transferability increased between different sizes of operators, small to large, type of operation, and geographical location in Europe.

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