

INTERMODAL TRANSPORT- A WAY OF ACHIVING SUSTAINABLE DEVELOPMENT

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ABSTRACT

Through this paper we tried to establish the important role of intermodal transport, but also the role of co-modal transport, concept that was introduced in 2006 by the European Commission, regarding the sustainable development. Both concepts refer to the efficient use of at least two modes of transport, with the difference that the second one takes also in consideration the optimal and sustainable utilization of resources. We showed that in order to obtain sustainable development it is important to realize a diverse, multimodal transportation system. Within our study we tried to present the benefits obtained by using the intermodal transport due to the transfer of freight to modes that generate less external effects.

Keywords: *Efficiency, sustainability, co-modal transport, external costs.*

1. INTRODUCTION

In 2001, the European Commission submitted a white paper on the future transport policy "European Transport Policy for 2010: Time to Decide" (European Commission, 2001). Through this white paper the European Union promotes an increased usage of intermodal transports, which is identified as a way of using the existing infrastructure more efficiently in order to achieve sustainable transport.

According to the UN/ECE, 2001, the standard definition of intermodal transport, define it as a transport that refers to the movement of goods in a single loading unit or vehicle that successively uses at least two modes of transport without handling the goods themselves in changing modes, trying to utilize the bests benefits from every type of transport mode in one integrated transport chain (Flodén, 2007). This transport is made in order to improve the economic performance of freight transport (Mathisen and Hanssen, 2014; Rodrigue et al., 2009), performance that it is obtained due to the fact that the most suitable transport mode is used on each part of a trip (OECD, 2001).

The evolution of "door-to-door" transport requires the development of intermodal transport because it allows the combination in a more advantageous manner of the benefits related to each mode of transport (on a particular route). Intermodal transport allows the convenient use of vehicles in order to achieve a much faster transport of goods at the lowest possible cost.

In intermodal transport results should be viewed in terms of intermodal transport company, in terms of users of the national economy (exporters / importers), but also in terms of benefits related to the environment. Thus for an intermodal transport system to be effective it is necessary to ensure the highest level of users satisfaction, users that benefit from the intermodal transport service.

So bet on the process of intermodal transport, the results obtained are complex:

- Direct results: here we can refer to the effects that relate to the movement of goods;

- Indirect results: here we can refer to the role that intermodal transport has in terms of:

- creating new jobs in the country in which they run their activities;
- supplying the national economy with imported goods;
- reducing the harmful effects of pollution due to the use of means of transport that are less polluting;
- the most important one refers to the introduction of modern technologies using containerization.

There are many advantages in using the intermodal transport but the most important one, related to our study, refers to its comparatively low external costs (Hanssen and Mathisen, 2011). When referring to congestion or energy consumption (Woodburn et al., 2007) it is clear that intermodal freight transport has an important contribution in achieving a sustainable European transport sector (European Commission, 2009), that is why it has been promoted by policymakers on all levels (Macharis et al., 2011). Sustainable development is one of the themes not only of the European Union but also of the world today, due to the fact that it is very important especially considering growing urban traffic problems and urban environmental problems (Xing, YY.; Liang, HY.; Xu, DB., 2013). We can easily say that intermodal transport offers an advanced platform for more efficient, flexible, reliable and sustainable freight transportation. In order to create sustainable urban environments it is very important to realize a diverse, multimodal transportation system (B. J. Wickizer and A. Snow, 2011).

When we talk about environmentally sustainable transport it is important to define three factors that contribute in promoting it (Elvik, R.; Ramjerdi, F., 2014):

- Modifying road user behaviour so that the external effects of transport may be reduced (some external effects include congestion, accidents, traffic noise and emissions to air);
- Transferring the freight transport to modes that generate less external effects;

- Reducing the volume of motorized travel.

2. THE CONCEPT OF CO-MODALITY

After some years of promoting intermodal transport solution the European Commission extended the meaning of inter-modality to full interoperability of transport modes. For economic and environmental reasons, the European Commission introduced in 2006 a new notion called co-modality that refers to “the efficient use of different modes on their own and in combination that will result in an optimal and sustainable utilization of resources”. This concept entails the development of infrastructures and actions that will ensure optimum combination of individual transport modes allowing them to be combined effectively in terms of environmental, economic, service and financial efficiency, etc. (Jeribi, K. et al., 2011).

There are many freight transport policies in the European Union that aim to increase co-modality and promote the sustainability of the European Freight Transport System. So, in 2007 in European Commission introduced the concept of “e-Freight” that tries to support the transport users, the transport infrastructure providers, the transport service providers and the transport regulators. In autumn 2007 was presented the Freight Transport Logistics Action Plan¹ that focuses among others on “Green” transport corridors for freight or sustainable quality and efficiency and relies on co-modality and on advanced technology in order to provide a competitive European surface freight transport system whilst promoting environmental sustainability.

Studies have revealed that, taking into consideration the infrastructural framework, co-modality is a process capable of reducing congestion and externalities, but also enhancing effectiveness and efficiency of transport (Enrico Musso, Alberto Cappato, 2010). There may be many differences between inter-modality and co-modality but the most important one is that the new concept focuses not on the freight transfer (from one way of transport to another, i.e. from road to maritime, river or rail transport) but on the total efficiency of the transport sector.

When we refer to co-modality we have to think about the principle that “public transport operates more successfully when it is planned as a unified network to support seamless multi-destination travel rather than as individual lines catering to single trips” (Dodson, Mees, Stone, & Burke, 2011), principle that is based on the concept of public transport network planning, i.e. “serving the maximum number of possible journeys with the minimum of operational resources” (Mees, Stone, Imran, & Nielson, 2010).

There were many studies showing that co-modal transport cuts transport cost, leading directly to the maximization of the efficiency of the transport chain, co-modal practices being profitable and sustainable. So did the study of Gomes and others (2010) that showed the

advantages of a co-modal transport system, taking in consideration both internal and external (accidents and pollution) cost, a system that reduce the social externalities.

So co-modal transport covers three important aspects (see figure 1) like the use of more than one mode of transport and their optimization (i.e. truck full), but also the use of the Intermodal Transport Unit. It tries to reduce the environmental impact of freight transport, but on the same time it requires a specific legal and interoperability framework (Silvia Rossi, 2012).

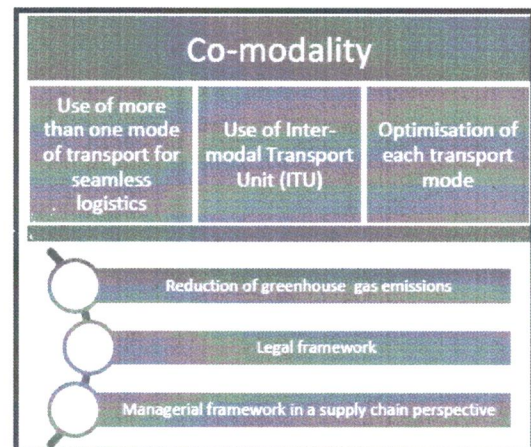


Figure 1. Dimensions of co-modality
Source: Silvia Rossi, CO³ Project, 2012

3. CASE STUDY

To show the importance of intermodal transport (taking into account the role of sustainability) we analysed the carriage of 4,000 tons between two different points A (a city) and B (a port). Within this study we have taken into account different types of transports, both unimodal and intermodal obtaining different costs, but we analyse only two of them: a unimodal transport² (road transport) and an intermodal one (rail-river transport). We analysed the total cost obtained for each solution considering both internal and external costs. It is important to say that when using different modes of transport the distance between A and B is not the same (referring to the final two solutions, due to the accessibility of road transport and also considering the rail infrastructure and river trail).

The results showed that intermodal transport cuts transport costs, the rail-river transport being with approximately 30% cheaper (see Figure 2).

Referring to the external costs it is clear that when using rail-river transport the social externalities are reduced, so we can easily say that using an intermodal transport will certain lead to an environmentally sustainable transport due to the transfer of freight to modes that generate less external effects.

¹ Communication from the Commission COM 2007 / The EU's freight transport agenda: Boosting the efficiency, integration and sustainability of freight transport in Europe COM(2007) 606 final

² A transport that uses only one mode of transport and where each carrier issues his own transport document

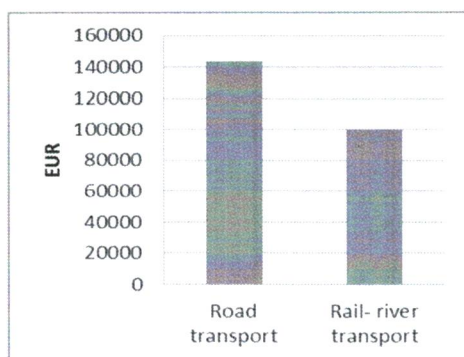


Figure 2. Transport costs chart

As highlighted by the study of CE Delft (2011), we can see that external costs in EU-27³ for road transport are much higher than for rail or inland waterways transport (see Table 1), when referring to accidents, air pollution, noise and some others categories of external costs.

Table 1. Total external costs for EU-27 by cost category and transport mode

Cost category	Road		Rail (freight transport)	Inland waterways
	LDV	HDV		
	Mio €/a	Mio €/a	Mio €/a	Mio €/a
Accidents	18,677	19,604	71	0
Air pollution	5,933	12,995	426	782
Noise	2,094	3,537	476	0
Biodiversity losses	208	893	1	69
Nature and landscape	284	284	21	64
Soil and water pollution	601	1,629	164	0
Urban effects	1,035	965	59	0

Source: CE Delft, Infrac, Fraunhofer ISI, External Costs of Transport in Europe, 2011

The study showed that the use of an intermodal transport allows obtaining benefits far superior to unimodal transport especially if there is a large amount of goods (we need to say that for this distance we have needed 84 trucks with a capacity of 24 tons in order to deliver 4,000 tons). Using an intermodal transport allows a considerable discount of transport costs but also of the external costs. It is important to note that the benefits obtained may undergo small changes because the transport system is a more complex one, especially when referring to variables that have an impact on sustainability.

4. CONCLUSIONS

There were many studies showing that co-modal transport cuts transport cost, leading directly to the maximization of the efficiency of the transport chain. As we saw intermodal transport is a key system in the

international transport, mainly because through it, transport modes compete with each other, benefiting the entire transport of goods. We should also notice that intermodal transport takes in consideration customers' demands (trying to satisfy them), but also the environment, sustainability being an important element of European Union policies, due to the fact that co-modal transport implies non-road freight transport on the long-haul.

We should also take in consideration the impact of external costs, that's why was introduced the concept of co-modal transport, that tries to obtain sustainable development. It is important to say that the main idea of intermodal transport is to utilize the strengths of different transport modes in one integrated transport chain (Flodén, 2007), so that in the end the economic performance obtained is the highest. So, it is clear, that intermodal transport leads to a significant contribution for sustainable development.

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³ Data include the EU-27 with the exemption of Malta and Cyprus, but including Norway and Switzerland

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