

ANALYSIS OF TRANSPORT'S EXTERNAL COSTS IN THE EUROPEAN UNION

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ABSTRACT

Pricing in transport is a complex process that depends mainly on costs. Before the promotion of sustainable development concept in every area of activity, the environmental costs were not being considered and included in transport pricing. But, for many years European Commission have taken these costs into account and sustained the internalisation of external cost in transport as an essential purpose in order to obtain fair and efficient pricing in the field of transportation. The present paper stresses the importance of external costs in transport sector and analysis this component of transport price in the case of every transport modes, especially in maritime shipping.

Keywords: *external costs, European Union, internalisation of external costs, road, rail, inland navigation, aviation, maritime shipping.*

1. INTRODUCTION

Although transport contributes significantly to economic growth, it generates side effects, through its negative influence on the citizens' health and on the environment resources. These effects are known as external effects, such as congestion, accidents, air pollution, noise, impacts on climate change and the cost associated to these are called "external cost".

For many years, the European Commission has raised the problem of estimation and internalisation of external cost of transport in the framework of research and policy development in the field of transportation. In all its strategy papers, the European Commission promoted "the need of fair and efficient pricing considering external costs." [1]

Some examples of this kind of works are:

- COM(95) 691, *Green Paper: Towards fair and efficient pricing in transport*, Brussels, 1995;
- COM (2009) 279 final, *A sustainable future for transport: Towards an integrated, technology-led and user-friendly system*, Publications Office of the European Union, Luxembourg, 2009;
- COM (2011) 144, *White Paper – Roadmap to a single European Transport Area- Towards a competitive and resource efficient transport system*, Publications Office of the European Union, Luxembourg, 2011.

2. INTERNALISATION OF EXTERNAL COSTS BY MODES OF TRANSPORT

An important challenge for European Union transport policy is the internalisation of external costs. "Internalisation, which is often referred to as the "user pays" and "polluter pays" principle means that these costs are made part of the decision making process of the users, usually by introducing market based instruments". [12]

"The polluter pays" principle is mentioned in the European Union Treaty as: "Union policy on the environment shall aim at a high level of protection

taking into account the diversity of situations in the various regions of the Union. It shall be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay". [12]

In the case of *road transport*, the Eurovignette Directive represents a central element in the European Union policy for internalisation of external costs. Its 2011 revision give the opportunity to member states to charge the full infrastructure costs, including some external costs like air pollution and noise.

In future distance-based systems of charging will replace time-based systems like the Eurovignette, as improvements in vehicle tracking technology can create opportunities for this method of charging.

Taking a brief look to *rail transport*, the instruments considered for the internalisation of external costs in this sector are railway infrastructure access charges and gas oil and electricity excises. The study analysed in this paper shows that all countries charge the wear and tear costs, some countries apply access charges including congestion costs and only few countries consider environmental or accidents costs (Czech Republic, Finland, Latvia, Sweden and United Kingdom).

Regarding energy taxation to railways, environmental costs are internalized through gas oil taxation (e.g. Finland, Ireland, Slovenia) and not through electricity taxation. This fact leads to the cancellation of the Emissions Trading System's impact on rail transport.

Referring to Value Added Tax (VAT) rates on energy for rail transport, almost every member states applies the domestic standard rate. Only Denmark applies a VAT exemption. In the case of intra-community and international transport most of the countries apply VAT exemption with refund of tax paid.

For *inland navigation*, port dues represent the principal charging measure, that all member states apply according to their local government's decisions. One of the main characteristics of internalisation of external costs is that this action is made indirectly through differentiation in vessel size.

An essential effect of the Mannheim Convention and Danube Convention is that all commercial inland vessels are exempted from fuel taxes in almost every member states of the European Union.

In *maritime shipping* the most important charging measures are fuel taxes, sea port dues, waste charges, fairway dues, VAT exemptions, VAT discounts. Some ports offer a discount based on the Environmental Ship Index Scheme, some based on the Green Award Certificate, or a NOx/SOx discount, sulphur fee.

The conclusions of the document analysed in this paper are that in many ports specific dues are raised on the cargo loaded/unloaded in the port, on passengers and their cars embarked/disembarked and for making use of quays. The waste charges are differentiated according to a certain characteristic of the vessel. The VAT rate for international sea passenger transport is zero in all member states and for domestic sea passenger transport usually the reduced standard VAT rate is applied.

Regarding *aviation* area, in all European Union member states' airports landing and take-off charges (LTO), passenger charges and parking charges are applied. Some of the airports have noise and emission charges. The calculation of noise charges takes into account factors, such as: effective perceived noise decibel at take-off, side-line and approach, the time of arrival or departure, the maximum take-off weight of the aircraft.

In aviation sector, emission charges are all based on the amount of emission value in terms of kg NOx in the LTO cycle and are calculated according to a general accepted calculation method. Only the tariffs per kg NOx differ among the airports, recording values from 2.22 euro to 7.78 euro.[12]

For international air passenger transport all the European Union countries don't apply VAT rate. Instead, for domestic air passenger transport most countries apply the standard VAT rate or a reduced one.

3. ANALYSIS OF EXTERNAL COSTS IN MARITIME TRANSPORT

Maritime transport has been a growing sector in the past 20 years worldwide and is one of the economically most important sectors in Europe. Ships transport 90% of the European Union's world trade volume and 40% of its internal commodity exchange. European harbours handle 3,5 billion tons annually. [18] This fact is the result of an increase in the number of ships, the cargo and the size of ships, as we can see in the figure below (year 1=1980, year 2=1985, year 3=1990, year 4=1995, year 5=2000, year 6=2005, year 7=2007).

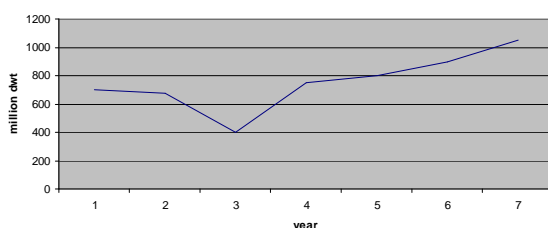


Figure 1. Evolution of world fleet in the period 1980-2007

Source: [18]

Empirical studies consider congestion, accidents, environmental and climate change costs. In the case of maritime costs, congestion and noise costs are considered a negligible component and accident costs are assessed similarly for other transport modes (see table 1).

Table 1. Specification of cost components according to transport modes

| Cost component | Road | Rail | Air | Maritime |
|--------------------------------|---|---|--|--|
| Costs of scarce infrastructure | Individual transport determines collective congestion. | Scheduled transport is causing scarcities and delays. | Scheduled transport is causing scarcities and delays. | Congestion is individual, if there isn't slot allocation in ports. |
| Accident costs | Level of externality depends on the treatment of individual self accidents. Insurance covers compensation of victims. | Difference between driver and victims. Insurance is covering parts of compensation of victims. | Difference between driver and victims. Insurance is covering parts of compensation of victims. | No major issue. |
| Air pollution costs | Roads and living areas are close together. | The use of diesel and electricity should be distinguished. | Air pollutants in higher areas have to be considered. | Air pollutants in harbour areas are complicated to allocate. |
| Noise | Roads and living areas are close together. | Rail noise is less annoying than other modes, depending on the time of day and the frequency of trains. | Airport noise is more complex than other modes. | No major issue. |
| Climate change | All GHG relevant. | All GHG relevant, considering use of diesel and electricity production. | All GHG relevant. | All GHG relevant. |

Source:[14]

Regarding air impacts, ship emissions on atmosphere include ozone and aerosol precursors (NOx, CO, VOCs, SO2 etc.) and the emissions of greenhouse gases. Emissions from ships contribute to climate change, as ship emissions let out 150-300 times more sulphur and twice as much NOx per ton-kilometre than a truck.

Being compared with other transport modes, maritime transport has "significant impacts on water, due

to the effects of ballast water and the use of antifouling varnish. Last but not least, maritime transport produces important impacts on soil, due to the high land use consumption entailed by location of harbours and due to sediment deposition".[14]

So, the conclusion is that the assessment of environmental costs is extremely important in order to calculate external cost of maritime transport.

Maritime shipping is considered less harmful to the environment than road transport. But recent studies change this statement due to the environmental effects of maritime transport: "It is estimated for the year 2000 that SO₂ and NO_x emissions from international maritime shipping in Europe amounted to approximately 30% of the land-based emissions in the European Union. Under business-as usual assumptions, SO₂ emissions from international shipping are computed to increase by more than 40% between 2000 and 2020, NO_x emissions by 47% and PM_{2.5} emissions by 56%. The European Commission expects that by 2020 the emissions of SO₂ and NO_x from maritime transport might exceed emissions from all other sources."[18]

Pollution from oil and other hazardous or noxious substances is one of the biggest negative effect that shipping can have on the marine ecosystem. This effect can have economic and social implications, referring to wildlife, tourism and marine environment.

In order to reduce these risks new improved measures and technical standards have been applied at European Union level. Many "technological advances allowed international regulations to be adopted, reducing the permitted operational discharge of oil effluent from machinery space bilges from 100 parts per million (ppm) to 15 ppm".[17]

Another source of pollution are the emissions from cargo ships over 500 GRT. Maritime transport is an important participant to air pollution, through the emissions of carbon dioxide (CO₂), nitrogen oxide (NO_x), sulphur dioxide (SO_x) and particulate matter (PM). EMSA estimates that "about 45% of all emissions come from European Union flagged ships and approximately 20% of emissions are emitted within the 12 mile limit of territorial sea".[17] Even if they are emitted at sea, the emissions from ships can cause problems on air quality onshore.

In order to resolve these problems, IMO has developed some policies to reduce greenhouse gas (GHG) emissions from ships. In this context, "market-based instruments are cost-effective policy instruments with high environmental effectiveness."[17]

4. CONCLUSIONS

Considering the negative effects that transport activity determines, it is essential to include the external cost associated to these in prices. So, congestion cost, accidents cost, air pollution cost, noise cost, climate change cost must be considered in the establishment of a fair and efficient pricing in transport sector.

There are different instruments of internalising external costs according to the characteristics of the

transport mode. So, in road transport the Eurovignette Directive is used for internalisation of external costs. In rail transport the instruments are railway infrastructure access charges and gas oil and electricity excises. Inland navigation uses port dues as the principal charging measure. Regarding aviation area, in all European Union member states' airports landing and take-off charges (LTO), passenger charges and parking charges are applied.

Maritime transport uses fuel taxes, sea port dues, waste charges, fairway dues as principal charging measures. Being compared with other transport modes, maritime transport can have the highest negative effects on the marine ecosystem, with major economic and social implications. In order to reduce these risks, new improved measures and technical standards have been applied at European Union level.

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