Sustainable pricing and European maritime policy

Elisabetta Venezia*

Abstract:

During the last few years, transport policy, both at national and at a European level, focused on the need to increase efficiency in the mobility of goods and passengers, also in sustainable terms. In this context, ports, considered as crucial nodes in global multimodal transport networks, gained growing importance.

The presence of overcapacity, stemming also from an inappropriate sizing of port infrastructures and the lack of a pricing system related to sustainable and economic criteria are example of interrelated elements that generate losses of efficiency within the port environment and that represent some of the main obstacles to the development of a fair competition, both within and among the different modes of transport.

The present paper intends to provide some reflections on the European port policy and on pricing setting procedures. The idea is to investigate the possibility of using fair pricing and a loyal competition to have, in the future, an evenly transport system based also on the use of more environmentally-friendly transport modes.

This work is organised as follows:

– firstly, recent trends of the maritime transport sector are briefly analysed in order to have a clearer idea of the context in which we are moving;

* Ricercatore in Economia dei Trasporti, Università di Bari “Aldo Moro”.

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secondly, the author focuses on the study and the critical analysis of the tariff system recently proposed by the EC and analyses the possibility to implement an alternative pricing method on the basis of current literature and practical applications;
finally, the paper provides some indications and sets out recommendations.

1. INTRODUCTION

The first concrete initiative of the European Commission on port policies, maritime infrastructures and their sustainability is contained in the Green Paper on ports and maritime infrastructures of 1997 [1] which launched the debate among the Commission and other institutions involved on the topics. The Green Paper is substantially based on the following aspects:

1. integration of ports with the trans-European transport network;
2. accessibility regulation to the port services market;
3. public financing of ports and their infrastructures;
4. pricing determination.

The debate brought about to the White Paper of 1998 [2] where, with regard to pricing, there are some adjustments in comparison with what was suggested in the Green Paper of 1997. Later on, in 2001, the European Commission issued another White Paper [3] on transport policy which gave emphasis to the role of ports as a way of pushing to a modal shift, that is to a more sustainable transport mode. Indeed, in the European Commission’s White Paper of 2001, ports have a critical role within the Community’s transport policy for the next years.

Following the indications contained in the 2001 White Paper, there were a series of documents, mainly on the quality of maritime services in the port areas, on State aids to ports and other financial aspects, and on the accessibility to port services. The general rule, anyway, is that any action to be taken in order to achieve strategic goals, also with regard to sustainability, needs ports to operate efficiently.

From a literature perspective, papers on EU ports policy mostly focus on competition and pricing issues. This paper takes a look at some recent developments in the EU transport policy area that affect the European port sector and reviews some pricing aspects with the criticism that there should not be any obligation to have a single pricing system due to different systems (administrative, political and economic) and approaches which characterise the different areas forming the European transport market.
2. Current aspects of the maritime transport sector

What is commonly observed is an overall growth in traffic which is caused mainly by:

- demographic growth and increase in per capita income,
- an increase in infrastructure investments – which in turn affects traffic growth,
- major improvements in technical standards, which have a significant scope for furthering the environmental performance of all means of transport.

Nevertheless, on the supply side, improvements in the functioning of railways, inland waterways and short sea shipping are still required and, with this regard, the completion of the internal network in these modes is of key importance. As to freight transport, and referring to goods port traffic only, Table 1 shows the traffic of goods transport in the EU major seaports. From there it emerges an average increase of 0.5% in the EU major seaports in 2006/2007, while intra-EU maritime transport was the second most important mode with a share of 37.3%. This may be the effect of specialisation and competition between and within ports. Moreover, it can be said that other factors, which affect this result, must be taken into account, namely:

- growing liberalisation of the internal market;
- quick technological changes;
- initial effects of the starting development of the trans-European Transport networks, which provide users and operators with greater choice in an intermodal environment.

All these factors affect the movement of traffic flows from one port to another and from one area to another [4]. The need stressed by the Community, though, still remains, to ensure a principle of free and fair competition. As far as maritime transport is concerned, regulatory steps are being taken by the Commission to ensure greater security to passenger-vessels and to protect the sea and its coasts from the pollution induced by the maritime transport of goods.

The EU has been active in promoting the concept of a sustainable transport system. The aim of this strategy is to improve the role of transport in fulfilling its economic function in the context of the single market, curbing the negative effects of transport on the environment.

Nevertheless, it is not easy to undertake a unique strategy valid for all countries. This is due to the fact that different Member States assign different levels of importance to each transport mode. For example, road transport is relatively more important for Spain than for the Netherlands, where inland waterways play the major role.
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<td>38.267</td>
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<td>43.355</td>
<td>44.644</td>
<td>37.777</td>
<td>-15.4</td>
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The share of private road transport is greater in Northern Europe (higher-income countries) than in Southern Europe (lower-income countries), which has higher shares of bus and coach transport.

Further, the trends within certain transport modes also differ among Member States. Broadly speaking, the growth in both freight and passenger transport by road in many Southern European countries is above the EU average. Therefore, there are objective obstacles to persuade countries to have a common behaviour with regard to a more sustainable transport system. But, despite these differences, there are common problems which affect most Member States and that can bring around a common table all the EU Member States. These include:

- increasing pressure on transport infrastructure, especially roads;
- increasing pressure on the provision and funding of public passenger transport facilities as car-ownership levels continue to rise.

In order to promote a sustainable alternative to land transport, the Commission’s Green Paper on seaports and maritime infrastructure [1] launched a debate on how to support ports in the European transport network and to guarantee and efficient functioning of ports as part of the door-to-door intermodal chain which can further stimulate the development of maritime transport. A problem that the Commission discussed in the debate of economic policy as far as marginal cost pricing tariffs are concerned, relates to the correction of externalities that may translate into distortion effects for competition. On the other hand, the Commission proposed to charge all externalities to all modes of transport and actively promotes the implementation of a sustainable transport system. Therefore, by internalising externalities, it is possible to have
an efficient transport market without the presence of distorting effects. These aspects have been dealt, in depth, also in the White Papers issued in 1998 and on which section 4 of this paper will further focus.

3. **Port efficiency, competitiveness and the European position**

On the basis of the aforementioned documents of the European Commission, it comes out that a sustainable transport system requires a fair functioning of the market which, in turn, needs efficiency. As a matter of fact, ports are an essential link in the trading chain and port efficiency is, therefore, an important element for international competitiveness.

Port efficiency, and consequently port productivity, can be variously determined. Particularly, port literature on productivity generally refers to the speed with which a ship can be loaded and unloaded. This, though, may seem insufficient: the need arises, therefore, to use a series of significant indicators which take into account the complex character of ports [6].

Among other contributions, some figures were presented in a study by Tongzon [7] on the basis of which – with some limitations - now it is possible to say something more on port efficiency, by using a data envelopment analysis (DEA). The author examines efficiency with respect to containerised cargoes among ports which are important for their high level of performance measured in terms of throughput. In his paper, the empirical analysis uses two outputs: TEUs handled and the ship working rate (which measures the number of containers moved per working hour). The input measures used are:

- number of cranes
- number of container berths
- number of tugs
- terminal area
- delay time
- labour factor in terms of the number of port authority employees.

In Table 2 results are presented. Tongzon uses two different models: the CCR DEA model (Charnes, Cooper and Rhodes) and the Additive model. Ports considered inefficient with variable returns of scale are also inefficient with linear production relations, but not the opposite. The author starts out by considering the two outputs (TEUs handled and ship rate), then presents the results obtained by using only one output (TEUs handled), due to some problems linked to the sample size. According to the second set of results, it comes out that Melbourne, Rotterdam, Yokohama and Osaka are inefficient with the CCR and Additive models, while the
ports of Felixstowe, Sydney, Fremantle, Brisbane, Tilbury and La Spezia are efficient for the Additive model and inefficient for the CCR model. Of course, these figures show that the efficiency results obtained depend on the type of model used which, in turn, depends on assumptions made on the properties of the returns of scale of the port production function.

Consequently, although it may be difficult to come up with a precise answer on ports efficiency if we use some “new” techniques, it should be appreciated the innovative Tongzon’s analysis that determined relative efficiency measures. It can help analyser to individuate efficient ports on the basis of some crucial elements.

Table 2 - Relative efficiency measures of some international ports

<table>
<thead>
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<th>Port</th>
<th>2 outputs</th>
<th>1 output</th>
</tr>
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<tr>
<td></td>
<td>CCR</td>
<td>ADDITIVE</td>
</tr>
<tr>
<td>Melbourne</td>
<td>0.5885</td>
<td>0.6633</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>1.0000</td>
<td>1.0000</td>
</tr>
<tr>
<td>Hamburg</td>
<td>1.0000</td>
<td>1.0000</td>
</tr>
<tr>
<td>Rotterdam</td>
<td>0.6644</td>
<td>0.8228</td>
</tr>
<tr>
<td>Felixstowe</td>
<td>1.0000</td>
<td>1.0000</td>
</tr>
<tr>
<td>Yokohama</td>
<td>0.8456</td>
<td>1.0000</td>
</tr>
<tr>
<td>Singapore</td>
<td>1.0000</td>
<td>1.0000</td>
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<tr>
<td>Keelung</td>
<td>1.0000</td>
<td>1.0000</td>
</tr>
<tr>
<td>Sydney</td>
<td>0.7676</td>
<td>1.0000</td>
</tr>
<tr>
<td>Fremantle</td>
<td>0.8251</td>
<td>1.0000</td>
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<tr>
<td>Brisbane</td>
<td>1.0000</td>
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<td>Tilbyry</td>
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<tr>
<td>Zeebrugge</td>
<td>1.0000</td>
<td>1.0000</td>
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<tr>
<td>La Spezia</td>
<td>1.0000</td>
<td>1.0000</td>
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<td>Tanjung Priok</td>
<td>1.0000</td>
<td>1.0000</td>
</tr>
<tr>
<td>Osaka</td>
<td>0.6050</td>
<td>0.6023</td>
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</table>

Note: A score of 1.0000 indicates that the port is efficient.

More generally, with particular regard to the efficiency and competition among ports of the Northern and Southern range of Europe, it is clear that the competitive scheme has already changed (see again Table 1) and that the transformations in the maritime transportation of goods on a world scale are giving an enormous emphasis to the Mediterranean area. In this context, some ports such as those of Gioia Tauro, Cagliari, Malta and Naples are strategic points located near the direct crossing of the
Mediterranean between Suez and Gibraltar. In particular, the emergence of the “pendulum routes” Singapore (the East)-Mediterranean, and Northern Europe-North America (Atlantic) will occur in the near future: these routes played an important role in the economic history of shipping and would regain a highly interesting competitive role. This appears to be extremely significant for the position of both Europe and the Mediterranean basin in the international traffic economy. As a matter of fact, for ports located in this area, it is important to note that their efficiency and productivity affects not only the opportunity to get larger benefits from ship economies of scale, but also routes and container transport [8]. In addition, as it will be discussed in section 4, port competition influences fares and the quality of services on the one hand, due to the fact that rates of throughput are increasingly important as ships sizes increase and, on the other hand, ports are largely integrated in the intermodal chain [9]. With this regard, it should be noted that intermodal transport is an essential component of the common transport policy for sustainable mobility. In this context, the importance of ports is clear, as they are crucial connecting points, transferring goods and passengers between maritime and land-based modes. Improved port efficiency will contribute to the integration of modes in a single system, provided that there are interoperability and interconnections among systems.

Nevertheless it should be underlined that, despite the increasing turnover in European ports, intra-European maritime traffic has not yet increased its market share vis à vis that of the road transport sector. The promotion and integration of short sea shipping (SSS) into environmentally-friendly multimodal transport networks has become an objective of the Union’s transport policy. Priority will therefore be given to SSS projects in the TENs and measures will be supported under the PACT programme. A cost-recovery pricing policy in road transport that better internalises external costs would be instrumental in boosting SSS.

With particular regard to this final point, it is important to underline that the European Commission is trying to promote the imagine of SSS by proving the affordability, quality and safety. Current measures adopted by the Commission tend to make simpler administrative and custom procedures, and to improve aspects which can determine port efficiency, by improving internal connections and favouring intermodal services through a fair determination of pricing for the infrastructure use. Further, SSS can be used to create maritime highways around current land bottlenecks which could consequently be integrated into trans-European networks alongside roads and railways. Better connections between ports and the rail and inland waterway networks will be needed together with better port services. Investments in new trans-shipment equipment can integrate inland waterways into this kind of transport structure. In addition, as for
intermodal transport of goods, the European Commission [10] indicates that it can be an efficient way of a door to door service which implies the use of two or more transport modes. The idea is that single modes, if properly organised, can fully exploit their own specific advantages – as for example low environmental pollution level, low energy consumption and so on – in the intermodal transport. So doing, the transport chains could be more efficient, more economic and sustainable.

The most recent document on these aspects is the Communication COM (2004) 453 [11] which contains a programme for the SSS promotion. The Commission underlines that, by supporting the SSS, results can be obtained also with regard to sustainable development objectives as indicated in the White Paper issued in 2001.

But are these factors influencing a port selection and how ports can compete one another?

Apart from their various marketing efforts, ports compete primarily on the basis of their investment programmes. Those ports which are improving intermodal facilities to minimise the dwell time of shipments and that are increasing the storage space available to terminal operators, supplying them also the relative quality services, have understood that carriers make two main decisions: on one side there is a short-term decision through which there is the assignment of shipments to ports, and on the other side there is a long-term decision by which vessels are organised in terms of routes and ports selection. These elements are enormously complex especially because the globalisation of the economy and the need for a sustainable growth are having a strong influence on international sea freight transport and its infrastructures. The new scenario is forcing commercial ports to design strategies which allow current and future challenges to be faced in a sector in which deregulation and competition are increasingly present. Particularly, the decisive commercial factors in the port business will be the keys to the strategic positioning and the struggle to be competitive. But apart from commercial aspects, ports should also consider technological evolution in implementing their strategies for improving competitiveness and sustainability.

Ports have become a part of the European transport system, in competition one another. In accordance with Perez-Lobajos and Blanco [12], following the European Commission position, the competitiveness of ports will depend on their capacity to integrate themselves into the transport routes and this capacity, in turn, depend on the added value with which the port can provide the client. In few words, ports have to adapt themselves to the demands of the clients in order to win loyalty and a look at sustainable aspects could be a further winning point.
4. The EU position on port pricing determination and discussion

During the last few years, the EU revised the norms on transport infrastructures in response to a series of changes regarding ownership, port organisation and fair pricing.

As to the activities of many European ports, they were affected by historical precedents, according to which their management was characterised by a regime of exclusive rights and/or legal or substantially public monopoly. As a consequence, port services were mostly charged to tax payers rather than to users, who - in their different figures – really use these services.

Phenomena such as market liberalisation, technological innovation and trans-European transport network development, stimulated everywhere a process of privatisation of the port sector, so that the economic and financial development of some ports – particularly those of the Mediterranean Europe and of the Baltic Sea – can at present be considered as experiencing a transitional phase.

From under this point of view, ports are considered as true “businesses” that charge their costs on users and evolve toward a more efficient management.

As aforementioned, the need for and organic and integrated EU policy for ports and maritime infrastructures derives from the fact that European ports represent crucial nodes for intra-community versus-third-countries commercial traffic and that maritime transport must meet an ever growing demand for transport. Moreover, maritime transport, especially cabotage, is considered as a means to alleviate congestion in road transport corridors.

EU initiatives as to maritime transport – as already stressed – have already focused on: the liberalisation of the port service market, as to guarantee free access and to stimulate competition; the development of a trans-European transport network; the promotion of intermodality. At present, interest is focused on:

- containing the negative impacts of transport on society, by favouring sustainable mobility;
- a correct charging of infrastructure costs through a EU port service pricing system.

At this regards, the European Commission issued two important documents, the Green Paper in 1997 [1] and the White Paper in 1998 [2]: the former considers port infrastructure as crucial within the EU transport policy; the latter introduces a new approach in transport pricing, the underlying logic of which is sometimes in contrast with the proposals relating to the port service pricing system exposed in the Green Paper.
As a result of the recent economic globalisation and growing competitiveness phenomena, which increased port competition, as well as the risk of distortions in trade flows among Member States, the Commission evidenced the need for a greater financial transparency in port accounting.

This goal entails the creation of an inventory of public financing granted to the main international ports and of the tariff system in use. The application of the new system must be gradual and flexible and must fit with the specific character of individual ports (ownership, geographic position, accumulated know-how, capacity and prestige).

As far as tariffs are concerned, they must be evaluated on the basis of costs. The costs to be taken into account generally include those relating to plants and those relating to the supply of port services. EU documents envisage three possible pricing systems as far as infrastructure costs are concerned: average cost, attribution of running costs only, marginal cost.

In particular, with the average cost pricing system, the aim is to cover production costs; with reference to public firms, the average cost pricing criterion is useful to consider both fixed and variable costs. The problem, in this case, consists in determining the part of price which must cover variable costs and the part that must cover fixed costs.

As to the social marginal cost pricing system, the EU Commission Green Paper prefers it to the average cost criterion, which permits to integrally recover infrastructure costs, and to the tariffs equal to the running costs, which do not include investments. The social marginal cost pricing system permits to achieve the goal of efficiency of the transport system within the Community and, according to what indicated in the White Paper of 1998, such pricing system ensures equality between internal and external variable costs on the one hand, and final prices on the other. This entails that social marginal costs are attributed to the transport service users. Users, therefore, pay for the internal and external variable costs deriving from the utilisation of transport infrastructures.

The Green Paper was the object of many criticisms, particularly for its “definition vagueness”, which would allow a dissimilar application of the suggested pricing criterion by each Member State.

At this regard, the White Paper proposes a pricing system based on the “user pays” principle, according to which utilisation and infrastructure costs, as well as external costs, are directly charged on users. According to the European Commission, such a redefined cost pricing policy will be able to strengthen competitiveness and efficiency of EU individual ports, modifying traffic flows according to a logic of free competition.

Despite what has synthetically been written so far, some doubts remain if we consider both scientific aspects and operative behaviours.
What are the current ideas on port pricing in theory and practice? Although port pricing has not been a popular topic in transport literature, there are a few publications worth mentioning. A good summary is given by Pettersen Strandeses-Marlow [13], who list, at least four different pricing principles from the literature:

1. cost-based pricing,
2. methods for cost recovery,
3. congestion pricing,
4. strategic port pricing.

In practice, the choice of an approach is strictly related to the nature of the final objective, which can be financial, operational, economic or marketing-related. Therefore, there is not a single solution. On the one hand, there are those who support the economic theory, who would choose marginal cost pricing, second best pricing and Ramsey pricing and, on the other hand, those who would choose full costs recovery, financial targets, rate of return on assets and profit centres [13].

In brief, the European Commission papers are mainly based on the concept of fair pricing, which implies the use of long term marginal social cost pricing. In order to comply with the deriving policy suggestions, therefore, the preference of users should shift from road to sea transport, as far as general cargoes and containers are concerned.

In this light, in order to strengthen SSS competitiveness with respect to road transport, port efficiency should be improved. It is worth noting that both the efficiency and the quality of services are crucial variables on which it is possible to work. In particular, the time spent in the port and the punctuality of handling the vessel and its cargo are among the major factors in terms of productivity and competitiveness underlying the quality of port services. According to some authors, one way to design a quality-based port pricing is to consider a two-part tariff which reflects a two-dimensional cost structure: the demand elasticity of price and of time. This is expressed by the following equation:

\[ C = d + f(t + p) \]

where \( d \) are the tonnage and goods due, \( t \) the duration of the port stay, \( p \) the waiting time reflecting punctuality and \( f \) the costs per unit of time. This price determination can be taken in due consideration – with opportune adjustments – if, in concrete terms, the idea is to determine a price which emphasises quality and competitive aspects characterising ports. It follows that, port competition can be said to be strictly interrelated with the quality of services and with fares. High rates of throughput and
reduction of port times will exploit economies of scale and reduce voyage costs per cargo unit, even though this will generate a higher demand in the requirements for space in the port area [9].

Following the charging systems and cost recovery practices proposed by the European Commission in the White Paper (1998), the European Commission submitted a questionnaire to Member States. Some of them answered that “they apply or require full cost recovery of the investments”, while others indicated that they try to generate incomes to cover investments undertaken by port authorities, without considering other financial flows [14]. It is clear, therefore, that port pricing, both for infrastructures and for services, is a complex matter and forcing the application of a uniform European pricing system has no sense. Probably, in this case, national authorities are the best actors to raise proposals in order to have a uniform national system which emphasises its own characteristics. This position is in contrast with the overall European Commission conclusions, which – notwithstanding the inventory results and the clear different countries’ needs – indicate the requirement of following common rules [14].

5. Concluding remarks

The theoretical model of welfare economics, on the basis of which the price setting according to the marginal costs will lead to maximal social welfare also in the case of concave technology, has been the basis of the European Commission to suggest the principle of social marginal cost pricing as a first-best rule for pricing transport infrastructures in the Member States countries. In particular, once the technology of the transport infrastructure system is concave, it follows that marginal cost is decreasing with traffic activity and below average costs. This generates a deficit that the European Commission suggests to cover by adding external costs of congestion, accidents and environment, by crossing subsidisation from road to rail or from urban to non urban areas, and by financing from the general budgets. In the end, EU countries should follow common rules.

Nevertheless, on the basis of the academic literature and on results stemming from current practises, there is no need for a uniform system of transport infrastructure prices for all transport sectors and all regional areas of the European Union. This is due to the fact that effective pricing systems reflect political objectives, institutional arrangements and other elements which are the history of single geographical-economic-political areas. It is highly recommended, therefore, to consider all the possible operative aspects and main peculiarities of areas when a pricing system
has to be suggested and, subsequently, implemented. In a real-world, pricing system applied to the transport sector will consist of a number of different and non-uniform elements and, therefore, there is no need to necessarily comply with an abstract general economic orthodoxy, while the world is going on another side.
References


