INTERNATIONAL JOURNAL OF TRANSPORT ECONOMICS

INTERNATIONAL JOURNAL OF TRANSPORT ECONOMICS

VOL. XLII · No 1 · MARCH 2015

SERRA

Four issues a year

⋆

Print and Online official subscription rates are available
at Publisher's web-site www.libraweb.net

Subscriptions:
Fabrizio Serra editore, casella postale 1, succ. 8, I 56123 Pisa, Postal account 17154550,
tel.+39 050 542332, fax +39 050 574888, fse@libraweb.net
Via Carlo Emanuele I 48, I 00185 Rome, fse.roma@libraweb.net

www.libraweb.net

⋆

ISSN 0391-8440
E-ISSN 1724-2185

INTERNATIONAL JOURNAL OF TRANSPORT ECONOMICS
ISSN 0391-8440 · E-ISSN 1724-2185
VOL. XLII · NO. 1 · MARCH 2015

*

CONTENTS

EUROPEAN TRANSPORT CONFERENCE 2013

STUDIES

INTERNATIONAL JOURNAL OF TRANSPORT ECONOMICS
ISSN 0391-8440 · E-ISSN 1724-2185
VOL. XLII · NO. 1 · MARCH 2015

TRANSPORT, LOGISTICS AND THE SUPPLY CHAIN: HOW CHANGES RESHAPE THE RESEARCH AGENDA

THIERRY VANELSLANDER · ENRICO MUSSO

TRANSPORT and logistics are clearly featuring a number of big challenges that have gradually emerged during the past decade. A first one is the growth in transport volumes (namely until the emerging of the "big crisis" in 2008/09) as well as in the size of transport equipment and related requirements for transport infrastructure. Witness to that is the rapidly growing maritime trade, from 2.6 bn tonnes of cargo in 1970 to 6.0 bn in 2000 and 9.5 bn tonnes in 2013. Notwithstanding the crisis, the average annual growth rate has increased approximately by 30% in the beginning of the XXI century compared to the previous 30 years (from 2.8% to 3.6%). Maritime shipping companies are hence looking for economies of scale, which can be achieved primarily through increasing vessel sizes, leading to the current deployment of 19,000 TEU vessels. This strategy not only follows the trend of the demand but also aims at reducing costs – namely when coupled with slow steaming, which can reduce fuel consumption up to 60% – and by this way increasing their market share regardless of a possible overall overcapacity. The scope for larger ship sizes is reinforced by the concentration of flows resulting from the hub-and-spoke pattern, and vice-versa: therefore, the shipping companies further develop hub-and-spoke systems, involving massified volumes between large international hubs, and ensuing feeder ships to nurture them from surrounding spoke ports.

These aspects, not limited to mere growth in flows, inevitably have deep impacts in the overall international distribution chains, particularly on the port and the hinterland transport side. If ports are not able to cope with large vessel sizes, they risk getting rapidly degraded from international hubs into regional or even national feeder ports, playing only a secondary role in international shipping, and being highly dependent on international hub ports. This crucially involves such issues as (*i*) the effectiveness of governance and decision-making for public bodies in charge for planning, (*ii*) the investment capacity for public or private companies managing port terminals, inland transport networks, inland terminals, (*iii*) the law and regulatory framework in which infrastructure planning and implementation is decided. But it is at least as much crucial that port authorities, as well as terminal operators and other players, get insight into the dynamics of international transport flows and related decision-making, and are ultimately able to forecast future flow developments and shifts. They should base their development and investment plans on such models. Good data and good models are the key to achieving this goal. Earlier research had already pointed out the problem of unreliable statistics (see e.g. De Lombaerde, 1994). The high quality and reliability of data/forecasts

are crucial to reinforce the legitimacy of planning and governance, namely in all those cases in which the upgrading of port infrastructure involves major public works which affect (or even are just suspected to affect) the natural environment or the surrounding urban community – such as dredging, or extending breakwaters, piers, etc. Planning and governance models must, more than in the past, be capable to upgrade the infrastructure and accessibility of the port in order to cope with the changing trends: this is becoming so much a key issue in port competitiveness that most recent studies on port reform process properly address it (see for instance Van de Voorde and Verhoeven, 2014).

In line with such forecasting and corresponding data needs, Ivanova in this special issue tries and establishes a relationship between trade and transport flows. In principle, a one-on-one relationship should exist – although imbalances in trade flows may well result into unbalanced geographical patterns of transport flows – but this relationship is not always easy to find, due to different methodologies and survey results. The author uses the inverse transport network equilibrium problem that simultaneously calculates both the Origin-Destination (OD) matrix of transport flows and estimates the parameters of route choice multinomial logit model on the basis of available transport survey data. The choice of transport network equilibrium model parameters is done in such a way as to minimize the distance between available trade data and the resulting OD matrix. The distance between the two datasets is measured by an entropy function. The methodology presented in this paper has been developed within the framework of the ETIS-Plus project funded by DG MOVE.

Assuming that a seaport is able to expand its ship handling capacity, it should also ensure that the goods can be brought from and to the hinterland in an efficient way. A waterside capacity increase implies that also the connections with the hinterland access modes as well as these modes themselves should be sufficiently large. The development of an efficient inland terminal network is also crucial in order to pursue economies of scale even on the land side (along with a reduction of externalities due to a higher efficiency of land – namely rail and where possible barge – transport) and to achieve significant economies of network as close as possible to the final destination (or origin). However, sufficient and good infrastructure is enough sufficient: the services provided on the hinterland networks are at least as much important. This involves road and rail transportation, and to the extent possible also inland waterway transport. For liquid and gaseous substances, pipelines are all too often overlooked as a fourth modality. It is the joint interplay between presence of infrastructure and quality of operations and services that will determine the success of an international distribution chain – and hence also of the ports that are part of it – as well as the opportunity to provide logistics services which can attract the location of distribution functions on a long term basis. To make the necessary investments, route and mode choice models must be implemented. The latter allow determining the size of infrastructure that is required, depending on current and forecast flows. Equally, such models allow avoiding that an excess of infrastructure is put in place, which is extremely costly and in the end constitutes

a loss of resources to the entire society. Especially in times where public means are scarce and risks (economic, political, financial, etc.) are rather high, it is important to be able to accurately forecast the future needs. Again, good data are required for doing so.

It is in the spirit of such need that Benitez, Romero, Caceres and Castillo here propose a method to test the quality of available OD data for road transport flows. Often, such data are collected through surveys. The sampling of users that get surveyed is therefore crucial. The authors develop a methodology, based on bootstrapping, in order to statistically estimate freight transport matrices. In this way, confidence intervals can be determined for all cells in OD matrixes. The technique allows for subsequent updating with more aggregate data. An application is made to data on heavy goods vehicles from the Spanish National Road Freight Survey. Applications to various others levels of measurement (e.g. national versus regional) and to other countries are possible and envisaged. The paper follows earlier publications in this same journal, like for instance Fullerton and Tinajero (2002) and Genc *et al.* (1994).

Feeding supply chains with commodities does not stop however with the physical flows that can be observed. A distribution chain is only as strong as its weakest element. That is true vertically, but also horizontally. And feeding supply chains with commodities is not just restricted to the physical flows. In parallel to them, hidden in ICT systems, information and payment transactions are moving between the actors of the supply chain. Because of its immaterial nature, the information flow is often forgotten or gets lesser attention. Research has proven that the main attention often goes to physical infrastructure, and that ICT systems lag strongly behind. Bringing ICT systems up to level is made more complex by the multitude of standards that are available and the lack of co-ordination in implementing one common standard. The latter is mainly due to the fact that several actors have developed systems and platforms in house, and are not willing to give up their own standard in favour of that of another actor. The bargaining power of players of the international chains also plays a big role here: shipping companies typically have developed or acquired their own systems, and have no incentive to undo the investment and replacing it by another investment in a different system that is for instance proposed by a terminal or a port authority, let alone that of a smaller land transport operator. Hence, other actors in the chain are obliged to follow the systems imposed by shipping companies, or to invest in 'translation' platforms that allow for communication with the systems of shipping companies. The multitude of applied shipping company systems requires investment from other actors in multiple communication modules, which is a high financial burden to them. That makes that, quite often, ICT investment not only is not a priority, but it is even financially unfeasible for relatively smaller operators.

Papoutsis, Gogas and Nathanail, in their study in this issue try to capture the attitude of different stakeholders towards the introduction of ICT into a supply chain for enhanced monitoring and information provision, as well as the impact on different actors. This is achieved through a set of surveys addressing all possible

impacted parties: shippers, receivers and society. The survey relies on a 'stated and revealed preferences' method. The outcome of this survey is a clear depiction of the approach that each stakeholder group follows in order to assess the impacts of ICT usage according to the needs of each group. Also, insight is provided into citizens' behaviour as consumers who face delays. The outcomes showed that the ICT adoption in supply chains is considered beneficial by all stakeholder groups and will assist in the mitigation of delays in the logistics environment. However, shippers consider that they will enjoy more tangible impacts. The authors indicate that future research could look into evaluating that kind of intervention by charging this service through its pricing and incorporation into bilateral logistics contracts. This could be better justified in case of special types of cargo (e.g. high value) where the lack of prompt information exchange might be critical.

Two more key current challenges for transportation and logistics industry are (*i*) the increasing importance of sustainability, and (*ii*) the fact that people tend to concentrate more and more in high densely urbanized areas. The former issue implies additional investments for transport and logistics players, for instance in green transportation systems. That is also needed, especially in relation to the latter issue: people get more and more sensitive about environmental pollution, and especially with ports often located nearby cities. An increasing share of population requires greener transport solutions so as to avoid excessive amounts of negative externalities, for instance through health impacts. But, on the other hand, the increasing concentration of population in urban areas also results in more deliveries of goods that need to be conducted inside the city centres, where a large number of people live, and the traffic pressure is higher. That means increased external effects, not only polluting emissions, but also noise, accidents, etc.. Hence, efficient solutions have to be found, in order to maximize the use of the available capacity, and that at the same time allow for a minimum of externalities to be caused.

Nordtomme *et al.* , in their paper in this issue, develop and apply a framework for testing the impact that various urban logistics solutions have in terms of transport flows, economics, environmental externalities and society. They attach strong importance on the points of view of various stakeholders. The authors subsequently test off-hour deliveries, booking of loading bays, multiple use lanes, uban consolidation centres, access restrictions, environmentally friendly vehicles and unmanned freight receipt. Both private and public actors were questioned in the ex-ante analysis with a survey on their estimation of impacts. In the ex-post analysis, a more factual approach is used, whereby indicators are used to test the impacts. Overall, it is found that greening can only be reached if a number of conditions are fulfilled. Equally, acceptability turns out to require a collaborative process where both facilitating and hampering factors are brought forward and openly discussed.

This special issue features four selected papers presented at the European Transport Conference 2013. They illustrate well the challenges mentioned above. It is clear that a lot of scientific work can still be done in each of these fields, so as to improve the methodologies to get insight into them, and to be able to provide adequate answers, also from the side of policy-makers and practitioners.

References

De Lombaerde, P. (1994), The Unreliability of Maritime Trade Statistics, *International Journal of Transport Economics* 01/1994; 21(1): 93-97.

Fullerton, T. and R. Tinajero (2002), Cross Border Cargo Vehicle Flows, *International Journal of Transport Economics* 06; 29(2): 201-213.

Genc, M., Inaba, F. and N. Wallace (1994), Disaggregate Mode-Destination-Quantity Decisions to Predictions of Aggregate Flows, *International Journal of Transport Economics* 01/1994; XXI(3): 269-285.

UNCTAD (2014), *Review of Maritime Transport* 2014.

Van de Voorde, E. and Verhoeven, P. (2014) The economics of port authority reform, a framework for ex-post evaluation, *International Journal of Transport Economics*, XLI, 3: pp. 297-326.

SET IN DANTE MONOTYPE BY
FABRIZIO SERRA EDITORE, PISA · ROMA.
PRINTED AND BOUND BY
TIPOGRAFIA DI AGNANO, AGNANO PISANO (PISA).

★

April 2015

(CZ 2 · FG 13)

Direttore responsabile: Fabrizio Serra · Autorizzazione del Tribunale Civile di Pisa n. 12/1997