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maritime economy

Global ports and urban development: findings from an OECD programme

by Olaf Merk[1]

Throughout world history, ports have been drivers of urban development. Is that still the case? That was the core question of the Port-Cities Programme of the OECD, conducted in 2011-2013, which resulted in ten reports on different world port-cities, four thematic reports and one overall synthesis report. Programme director Olaf Merk elaborates in this article on the main findings of the programme: port-cities are subject to a mismatch of benefits and negative impacts, intensified by trends in global shipping, which results in complex policy challenges, but effective port-city policies are able to solve these.

The port-cities mismatch

Well-run ports produce many economic benefits. They lower the costs of trade, generate value added and employment and attract certain economic sectors. Doubling port efficiency of two countries has been found to increase their bilateral trade volume by 32%. One tonne of port throughput is on average associated with USD 100 of economic value added, and an increase of one million tonnes of port throughput is associated with an increase in employment in the port of 300 jobs in the short term. Moreover, ports are associated with innovation in port-related sectors. Nine out of the 10 world regions with the largest amount of patent applications in

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[2] The *"Synthesis Report. The Competitiveness of Global Port-Cities"* can be downloaded for free from: www.srm-maritimeconomy.com.

shipping are home to one or more large global ports, including Houston, Los Angeles/Long Beach, Tokyo, Oakland and Rotterdam.

Most of the economic benefits of ports spill over to other regions. These spillovers include lower costs of external trade and indirect economic linkages, such as the links of firms in the port with their suppliers. Our studies on Hamburg, Le Havre and Marseille they show that generally more than 90% of these effects spill over to regions other than the port-region itself. Economic specialisations related to a port economy also spill over to other regions: maritime-related engineering in Rotterdam for example, are only to a limited extent located in the city, but to a much larger extent in the Rotterdam metropolitan region and the rest of the Netherlands. Port-related employment is increasingly spreading out over larger areas, away from port regions. Ports can provide interesting sites of renewable energy production, and in particular biomass production, considering the large diversity of commodity flows and sophisticated refinery infrastructure, but this production capacity will most likely serve a wider area than just the port region. And although the port can be a revenue source for local governments, in many cases the national government receives the net profits because cities often do not own their ports. In short, most of the benefits of ports leak away to other regions.

However, most of the negative effects of ports are highly localised, including air pollution, environmental degradation, noise and visual pollution. The impacts of hinterland traffic are also mostly local, because most of the short-range hinterland traffic is by truck (more polluting), whereas most of the longer-range hinterland traffic is by modes with less negative externalities (rail, barge). These impacts can be very substantial; e.g. more than half of the sulphur dioxide emissions in Hong Kong are related to shipping, and a third of the land surface of the city of Antwerp consists of its port. In addition, port truck traffic accounts for more than 85% of total truck traffic on some sections of the highways in Los Angeles.

Evidently, concrete impacts and implications differ depending on local circumstances, on the character of the port-city interface and the functional composition of the port and its city. Large-scale industrial development on or close to port sites requires a huge amount of bulk goods, generally associated with fairly limited job intensity, a variety of environmental impacts and strong local economic linkages. Container traffic has similar low job intensity, fewer local economic linkages and environmental impacts related to shipping and hinterland traffic, but overall less polluting impacts, because the connected economic activity is less industrial. Maritime business services generally generate high value added and limited environmental impacts, but are connected to large ports or large metropolitan areas. Cruise ship-

ping is less space intensive than most other port functions, but the economic value it generates is fairly limited unless it is linked to a port-related waterfront. However, it can have relatively severe environmental impacts (emissions, noise) especially if terminals are close to city centres, which is frequently the case.

Different port and urban growth patterns also lead to distinctly different impacts and policy challenges. The main challenge of port-cities with growing ports and a growing population is the development of new port sites. Here, the pressing issues include space constraints, congestion and under-capacity of the port, with the need for infrastructure investments and relocation of port sites. This subsequently opens up the possibility of transforming port land into housing or mixed urban development. Growing cities with ports that face declining traffic volumes typically convert to urban waterfront development. While they may also be dealing with a transformation of port land to different uses, like port-cities with growing ports and population, their port area simply shrinks. The cities in which the population is shrinking and the port growing have a different concern, which is to find port cargo outside the metropolis and better connections with the hinterland. Finally, the port-cities where both ports and cities are in decline need to find new sources of growth. Transformation of port areas there may require less new housing development and cultivate leisure or business areas instead, as well as attempts to attract new services and port niches.

Tab. 1 – Policy challenges for different types of port-cities

	Growing city	Shrinking city
Port growth	New port sites (Singapore)	Extending hinterlands (Rotterdam)
Port decline	Urban waterfronts (Baltimore)	Economic transformation(Bilbao)

Source: OECD

Comprehensive evaluation of the port-city mismatch identified above is difficult to quantify, in particular due to difficulties in quantifying negative impacts. However, various studies have been conducted in recent decades to quantify negative impacts. For example, a study from 2006 calculated the external costs of hinterland traffic related to the port of Rotterdam to be around EUR 240 million. A contingent valuation study on Valencia calculated that the average compensation required would be around EUR 100 per family negatively affected, amounting to a present value of the costs borne by local citizens of approximately EUR 41 million. Proximity to the Greek port of Piraeus was found to affect housing prices negatively, whereas this is the inverse for proximity to metro, tram, suburban railway and bus stations. However, the general lack of a broad base of quantitative assessments makes it

difficult to generalise about the extent of the port-city mismatch of benefits and negative impacts; much is unknown and much depends on local circumstances.

Trends in global shipping have a profound impact on port-cities

Developments in global shipping have increased the port-city mismatch of benefits and impacts in recent decades. Containerisation has led to a standardisation of cargo handling, requiring less local labour. Growing ship sizes resulted in port concentration and the emergence of hub-and-spoke port networks. By means of illustration: the top ten North American ports in 2009 handled half of the total port volume on their continent; this share was 35% for Asian ports and 27% for European ports. Moreover, the concentration among container ports has increased in recent decades, as indicated by the increasing scores on the Gini coefficients among ports in Europe, NAFTA and Asia. Analysis of the most dominant relationships of each port with other ports, based on a dataset of vessel movements, shows that ports are indeed subject to hub and spoke tendencies, and that a limited number of ports, such as Singapore and Hong Kong, act as a central node for many other ports.

As a result, port functions in several cities declined or stagnated. Logistics activities moved out of port regions to places with more available land, spreading out port-related employment. Urban ports moved more or less gradually to new port sites, in order to accommodate urban demands for land and maritime industry demands for terminals more suitable for container handling. Our study of Helsinki described a radical re-location of a port, whereas the study on Rotterdam showed a more gradual pattern. Large ports expanded their hinterlands towards new regions, reducing their dependence on the port-city. The consolidation and globalisation of the shipping and port terminal industry changed port authorities' influence. Terminal operations used to be a public or local activity, but in recent decades, global terminal operators have massively expanded, often at the cost of local operators, and are now present in all large world ports. Operators with fewer local connections are less inclined to take into account the benefits or impacts on local communities, whereas global carriers have emerged as important players with huge market power (sometimes representing up to a quarter of local port traffic) that are able to shift almost instantaneously from one port to another. Moreover, these carriers have been able to transfer the costs of increased vessel sizes, such as dredging and hinterland infrastructure, to public authorities.

These developments are expected to continue. The average size of a container vessel has doubled in the last decade from an average capacity of 2 000 20-foot equivalent units (TEUs) in 2000 to more than 4 000 TEUs in 2010, a trend that is continuing with as a current wave of new vessels of 18 000 TEUs come into operation. This will

no doubt reinforce the process of port concentration. A process of port regionalisation is under way in several countries, which will arguably further distribute the employment and value added related to port activity. Emerging markets are attracting the interest of global port terminal operators, which could reduce the local affiliations of ports in these countries.

The implications of these developments are increasing pressure on port-cities to show that ports can continue to be an asset for urban development. With economic benefits spilling over to other regions and negative impacts highly localised and concentrated, in line with port concentration, port-cities will be increasingly confronted by existential questions eroding their local support and "license to operate". Port-cities must find ways to address such imbalances. How can they ensure that the port creates value for the city and that negative impacts are mitigated? How can they formulate a new balance of benefits and impacts?

Good port-city policies make a difference

Choosing an effective strategic policy must be informed by a clear assessment of existing local assets. Economic history is to a large extent determined by path dependency, and heroic, if not always successful, attempts to change existing trajectories. Not every port-city or every maritime nation can or should stake its economic development on the growth of its maritime cluster, if only because there can only be a few leading global maritime clusters in the world. Various port-cities have invested in heavy industrial development, which provides them with certain assets but also involves sunk investments that can limit alternative economic development. Similarly, not all port-cities can develop a successful waterfront, because success is defined by how well it can divert visitors, high-earning residents and investors away from other urban waterfronts. Only rarely, as in Bilbao and Bremen, have radical conversions of the economic destiny of a port-city had unqualified success. Looking for an effective policy mix is a delicate balancing act between building upon existing strengths and developing new assets and capabilities.

What makes a port competitive?

Four elements are essential for achieving a competitive port: maritime connectivity, effective port operations, strong hinterlands and cultivating local goodwill. Ports with good practices in one domain tend to perform well in others, as in the case of Rotterdam. The continuing increase in ship size calls for better hinterland connectivity, whilst the trend towards port concentration makes local goodwill an important part of sustaining ports' functions close to cities. However, much depends on local circumstances. Some factors are exogenous, such as geographical location and

to some extent nautical access, but even these are subject to change for example in the case of the future navigability of the Arctic seas. Port authorities have an important role to play in improving ports' competitive position, with the help of other actors, including national governments, cities and private terminal operators. Our study of Mersin illustrated how impressive port growth rates were related to the arrival of a private terminal operator. The area is relatively well researched: the determinants for competitive ports are known and identified, even though it is not always clear what this should mean in terms of concrete policies. Our study indicates that, in general, port policies have a positive impact on value added and economic performance.

Synergies between ports and cities

The interaction between ports and their cities is complicated by a series of policy dilemmas. Port authorities and city governments do not necessarily have the same interests, goals and perception of challenges and policies needed. Typically, port authorities are concerned with cargo handling and ways to grow in this respect. Their priorities for transport investments are freight transport networks, efficiency of port labour, and land use dedicated to cargo handling and port-related industries. From the environmental perspective, their interest is to limit negative impacts. An urban government is not principally interested in port volumes, but in the value added it generates for the city; not in efficiency of port labour, but in the number of jobs that it can generate, preferably high value added jobs. Cities will generally have a wider set of challenges to address, including housing and urban transport, both issues of relevance to their constituencies, so they tend to prioritise urban passenger transport and have an interest in redeveloping urban waterfronts into housing areas. Environmental policies they favour extend past merely limiting impacts, toward marketing quality of life as one of their city's competitive advantages, as in Copenhagen, which promotes the swimming facilities in its harbour. The challenge for port-cities is to find synergies between the two perspectives, e.g. by introducing smart, selective goals for port growth, attracting high value added port employment, using the port as a site for green business and developing mixed urban waterfronts with room for port functions.

Increasing local economic benefits from ports

Three main economic policy models for port-cities can be identified: maritime clusters, industrial development and urban waterfronts. Maritime services clusters try to attract high-value-added services related to the maritime industry, such as maritime finance, consulting, law and engineering services. Industrial development rela-

ted to ports has traditionally taken place because many industries are interested in being close to imported resources and consumer markets. Finally, waterfront development has frequently managed to capitalise on their port and maritime heritage and transform this into a source of urban growth. An additional economic strategy for port-cities is diversification, away from what is sometimes considered too strong dependency on the port sector.

A range of policy instruments can be applied to support these strategic orientations. These include incentive schemes, training and education, platform organisations and knowledge transfer schemes to attract high-value-added companies that could make the city an international maritime services centre; Singapore is a clear example of pro-active policies in this regard. With respect to industrial development on port sites, many initiatives have emerged that position the port as a site for industrial ecology (Rotterdam) and renewable energy (Bremerhaven). Master planning and financial mechanisms for redevelopment have been applied to waterfronts to create areas with a productive mix of functions that still maintain port functions, such as Port Vell in Barcelona.

Tab. 2 - Port-related economic strategies

Policy option	Related Sectors	Instruments	Examples
Maritime clusters	Logistics Maritime services Shipbuilding/repair	Developmental support Fiscal incentives/grants Co-ordination/information Human capital matching	Singapore Hong Kong
Industries	Industrial ecology Renewable energy	Spatial planning Investments	Rotterdam
Waterfronts	Tourism/recreation Food Events industry	Master planning Project implementation Incentives/investments Synergies with port	Barcelona
Diversification	Non-port sectors	Similar instruments	London Liverpool Boston

Source: OECD

The three main models have different orientations, but are often simultaneously pursued in the world's largest port-cities. Some of these functions are easier to combine than others. Maritime clusters and urban waterfronts can reinforce each other, whereas a successful marriage between industrial development and maritime clusters is not as easy to achieve, thanks to the fundamentally different logic that informs them. However, port-cities such as Singapore and Hamburg have managed to combine the three strains, through a judicious choice of policies.

Mitigating negative impacts

A variety of types of policy instruments can mitigate negative port impacts, from regulation to market-based incentives, information and technology upgrades. Many of the policy choices made will depend on the local situation, but the most convincing examples of policy performance involve a coherent package of inter-related instruments, such as those used in Southern California for the San Pedro Bay Ports Clean Air Action Plan. Mitigating negative port impacts requires the interplay of different levels of intervention, ranging from the local on up. Given the nature of the shipping industry, some environmental impacts of shipping are best tackled at the global level. Self-regulation of ports can work, but in most cases, external pressure is needed. Some port-city policies entail join benefits. For example, reducing port-related traffic congestion has positive environmental effects; and modal shifts of hinterland traffic not only improve environmental performance but can also reduce traffic within the city.

Public policies can be effective in increasing port-city performance. In terms of overall policy packages, there are clear indications, based on our research, of the effectiveness of port policies, transport policies and policies stimulating university-business co-operation: more active policies in these fields have a positive influence on performance. In terms of specific instruments, relatively much is known on the most important factors for competitive ports, even if policy design and implementation relies in most cases on the common sense of port authorities, rather than on established academic insights. There is some evidence of the effectiveness of certain transport policy instruments, such as the Clean Truck Program and terminal gate strategies both applied in the ports of Los Angeles and Long Beach. Several ports have also started to track environmental impacts, the reduction of which can sometimes be linked to policies. However, the impact of specific policy instruments in many areas remains to be clarified. The OECD Port-Cities Programme has contributed to more systematic knowledge on port-city policies, but – as always - more extensive study would be needed.

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