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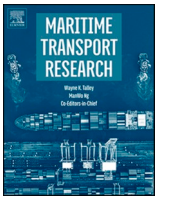

Ports as business eco-systems in transition

While much research in the field of transport is focused on the role of ports as transport nodes, ports generally develop into more diverse economic complexes and attract manufacturing, logistics and leisure activities. Research taking this into account has conceptualized the port as a cluster (de Langen & Haezendonck, 2012) and subsequently as a localized 'business ecosystem' (Hollen et al, 2015).

The port business ecosystem often includes energy production, chemical and metal industries and vast amounts of warehousing space. Port business ecosystems face huge transition challenges in light of emerging transitions, leading to important questions regarding the role and strategy of the port development company (or port authority) in developing such a diverse ecosystem.

The most impactful transition is towards sustainable energy systems and circular value chains. Circularity involves sharing, reusing, repairing and recycling materials to reduce waste production to a minimum. For instance, leading port development companies (PDCs) in Europe, like Rotterdam and Antwerp explicitly state the objective of attracting 'circular economy' (CE) activities (Haezendonck & van den Berghe, 2020), such as plants for recycling e-waste. As these CE activities differ substantially from the traditional port activities, the transition towards a circular economy has important implications for cargo flows, land use and business models in ports (De Langen et al, 2020). Hence, it also impacts the port's strategy and monitoring of its future strategic ambitions in this regard.

In this special issue of Maritime Transport Research (MARTRA), five papers dealing with (sustainability and circularity) transitions in port business ecosystems have been accepted after a peer-review process. These papers address this issue from various perspectives. As this field is (still) emerging, all papers develop conceptual contributions based on empirical case analysis. These cases are all in the North Sea region, more specifically Belgium, The Netherlands and Denmark. This is not surprising, as on the one hand the ports in these regions have grown into diverse ecosystems (with huge associated transition challenges) and on the other hand, these countries lead the circularity transition, due to supportive policies, both national ones and at the EU level, a high awareness of the societal benefits of circularity, leading to demand for circular products and pressure on companies to become more circular, and a surge of companies with circular business models and advanced (technological) capabilities. Thus, the case study ports in this special issue provide an excellent basis for deepening the understanding of sustainability and circularity transitions in port business ecosystems.

Two conceptual papers, with a single case study, advance the understanding of the role of the state-owned port development companies (PDC) in advancing the transition of the port business ecosystem. The newly developed concepts are first, in Sornn-Friese et al. (2023), that of the PDC as a transboundary 'system builder' as demonstrated by the case of Esbjerg port in expanding the North Sea offshore wind industry, a critical element of the goal of decarbonization of Europe. Second, in the paper of de Langen (2023), different strategies of PDCs are distinguished, based on three types of services that PDCs may provide; minimalist, integrator and ecosystem services. The case of Rotterdam's PDC shows it provides services in all categories and overall follows a 'platform provider' strategy, focused on developing the port business ecosystem as a platform in which third parties can thrive.

The three other papers included in this special issue deal specifically with the transition towards a more circular economy. Van den Berghe et al. (2024) take a spatial planning perspective and employs a scenario method to assess the role of circular activities in 'water bound' industrial areas (i.e. areas accessible by inland or maritime vessels) and in addition uses precise shipping and activity data to identify terminals and industrial areas in port, the port city, and the hinterland, that will play a key role in the circularity transition.

The second contribution of Courtens et al. (2023) on circularity takes a business development perspective to develop circular activities in *gateway ports* without the availability of volumes of end-of-life materials, as opposed to industrial ports or ports in metropolitan areas (or urban) ports. The authors propose a six-step process to attract circular activities, focused on identifying and capturing opportunities to attract new value streams.

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The final study in this special issue of Faut et al. (2023) addresses the important topic of indicators of progress with regard to the transition towards circularity. There is a clear need for such indicators, both from a policy perspective and a (corporate social) reporting perspective. A port's and port company's circular strategy cannot reach its goals or become more ambitious, if progress cannot be measured in an appropriate way. The paper uses content analysis, focus groups, a gap analysis and a survey to develop a set of implementable indicators for circularity in for ports.

Overall, the papers in this special issue advance our understanding of ports as business ecosystems in transition and have clear practical implications for port development companies and policy makers.

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