**Literature review – Ports and their Hinterlands, Past and Future**

**Introduction**

This literature review is concerned with historical development of ports and the implications this has for port communities, as well as the wider transport and logistical infrastructure. This was done with an eye toward current challenges such as the decarbonisation of the maritime industry - how can past technological transitions in port cities such as the move from wind to steam, and later from coal to oil, help us understand and navigate the current shift toward decarbonisation and alternative fuel sources?

I initially wanted to focus on the relationship between port and urban development, with the following questions in mind:

* + **How have ports expanded?** What has the development of port cities been like in terms of urban policy and port growth? What are main factors that shape the development (and success) of port cites?
	+ **How have ports handed transformative technological change such as the shift from sail to coal and then to oil in the past?** What were the economic and social impacts on the port communities across time and space?
	+ **How have actors responded to and negotiated these changes?** Who were the winners and losers?
	+ **What does it mean for current challenges such as decarbonisation?** How can policy respond?

However, after looking over the archive collection I realized that it might be difficult to find articles that directly answered these questions, especially the question on how ports have handled transformative technological change. I have therefore broadened the scope of the literature review to articles on port development more generally. At the same time, I do discuss the answers to these questions but the write up is based on content outside the HEC collection, even as some of the information is drawn from articles across the Lloyd’s Register Foundation’s website.

**Methods**

This literature review is centred on the HEC library catalogue where I searched for material on port development and its relationship with the hinterland. For each search in the HEC library catalogue, I noted the initial number of search results, before screening the title and abstract to select articles which related to the historical development of ports and how it has related to technological change. For these included articles, I then provided a record of the title, author, and date. I also provide a brief summary based on the abstract and comment on how this can be related to how ports have developed and the implications this has for the maritime industry.

I have also included material from other sources outside these two databases. Additional resources such as other archival collections, books and journals are listed at the end.

**Findings**

Port development

I begin with articles on port development, mostly containing case studies, where I have drawn out key themes related to how ports developed alongside technological changes and processes of industrialisation. A search for ‘port development’ on the HEC archives returned 238 results which were screened by title and abstract. The articles covered a wide range of topics spanning environmental concerns about shipping and port development, descriptions of new designs for types of ships such as ro-ro transport, historical accounts of port development.

Hence, the titles and abstracts were screened for materials which discussed the historical development of ports and for how it might have navigated technological transitions. The remaining 34 articles are listed with my own comments on how the articles may be relevant to the questions of port development and decarbonisation. Even as these articles may not fully answer the initial review questions, particularly the point on how ports may have handled transformative technological change, they still discuss strategies for port development. They also serve to highlight long standing concerns about port management such as investment in infrastructure and transport links, as well as the environmental impact of coastal developments.

1. ***Tu, D. (1995). Port of Shanghai - development strategies and targets for the new century.***

Considers Shanghai’s trans-century development targets and how port development can be coordinated with the city for mutual benefit.

1. **Sciutto, G. (2002) *Port development versus technological development: the challenge of keeping the pace.***

Discusses the different timelines between port planning and ICT development which leads to “a situation where new infrastructures are run with a technology level generally corresponding to a former period”. May be useful when considering how to navigate technological change more generally.

1. ***Frost & Sullivan. (1981). Shipbuilding and port development in China Vol I & 2 (1981)***

Covers China’s maritime history, organisation and policy. May be useful as a case study for how a particular context navigates technological change and development.

1. **Scottish Council. (1971). *Oceanspan 2 A study of port and industrial development in Western Europe.***

Covers ports and transportation, industrial development and opportunities for development.

1. **Psaraftis, H.N. (1998). *Strategies for Mediterranean port development.***

Discusses development strategies for Mediterranean ports and the role of infrastructure and superstructure improvements. May be useful as a case study for port authorities, governments and shipping companies.

1. **Jolic, N. (2005). *Development of an integrated information system: a tool for establishment of port competitiveness.***

Analysis of port systems and evaluation of proposed information system in ports

1. **Fair, M.L. (1954). *Port administration in the United States.***

A book on port administration, development, and functions. May be useful in charting how port operation and management have developed and how these are related to wider government policy

1. **Hoyle, B.S. & Hilling, D. (eds), (1984). *Seaport Systems and Spatial Change: Technology, industry and Development Strategies.***

Covers sea port systems on processes of spatial change with special reference to the technologies, industrial development patterns, and regional planning strategies. May be useful in drawing out relationships between seaport development and technology; how seaports around the world can accommodate advances in technology and government policy

1. **Huggett, D. (2003). *UK port development - looking to the future by learning from the past.***

Considers problems encountered int he past and applies it to the 2000 Integrated Transport White Paper on ports. May be useful as an example of hindsight research.

1. **Ircha, M.C. & Thomas, B.J. (1997). *Port training – from management to portworkers***

Reviews traditional port maangement training and describes a new systematic approach, TRAINMAR - Training Development in Maritime Transport. May be useful for understanding investment in port infrastructure and labour affairs and how this can be leveraged in the transition to green fuels.

1. **Marcon & Expo. (1981). *Marine and port technologies - a look into the future***

Provides glimpse of future trends in port development; mentions concerns around environmental impacts of shipping as well as technological developments like containerisation, propulsion technology and alternative fuels. May be useful in sketching out strategies to take advantage of emerging trends which can then be applied to the current content of decarbonisation in the shipping industry and development of green and smart ports

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1. **Pullat, S. (2004). *Port logistics and infrastructure development.***

Explores development of port logistics and infrastructure and how this has changed in era of privatization. May be useful in designing incentives for investment in infrastructure and development of facilities to support decarbonisation.

1. **Barham, P. (2003). *Development at the coast: new thinking - long-term solutions.***

Identifies issues surrounding coastal planning using the Humber Estuary as an example and how sustainable development principles can be incorporated in solutions to environmental issues. May be useful as a case study for how port development can make use of opportunities to enhance habitats and protect wildlife.

1. **RSPB. (2003). *Port development and nature conservation - supply and demand in the GB Ports Industry.***

Addresses conflict between ports and environment. May be useful in directing the development of green ports and how to manage growing ship sizes with environmental and geographical concerns.

1. **Bruzzone, A.G., Mosca, R., Esposti, P.D. et al. (1998). *Distributed development of simulation models for harbour processes***

Provides overview and proposes advanced modelling techniques for developing simulators for harbour environments. May be useful as an introduction to simulation models which can be used for the design of green ports and management of port facilities in the future.

1. **American Association of Port Authorities (1973). *Port planning design and construction 2nd edition***

Provides information on problems faced in development of port facilities and possible solutions. May be a useful reference for the design of future ports which have to adapt to alternative fuel sources.

1. **Hirst, J. (1995). *Port perspectives on current environmental issues.***

Introduces principles for environmental management and environmental concerns such as ballast water waste management and dredging waste disposal. May be useful in designing ports of the future if these environmental challenges are still an issue with zero-emissions vessels and ports.

1. **Velter, G. (1993). *Ports and their environment - the Port of Le Havre a proactive port for environmental protection***

Reviews environmental action on UN level and uses Le Havre as a case study in defending the environment. Might be useful in directing how ports of the future can be similarly governed in order to ensure limited environmental impacts and fit within the decarbonisation agenda.

1. **Carr, G.V. & Brinkhurst, J. (1985). *Developments in the port of Tyne with particular reference to the Tyne Coal Terminal***

Provides a historical account of the development of trade and port facilities at Newcastle-upon-Tyne. Might be useful in drawing lessons as to how the port has navigated changes such as the change in goods, industries, and facilities.

1. **Bahrain Society of Engineers. (1977). *Engineering and development in the gulf: Bahrain Society of Engineers seminar***

Presents the papers given at the Bahrain Society of Engineers seminar which cover topics like education and training of engineers, practical applications of solar energy, port planning and development, and the future of petrol chemicals. Might be useful when considering technological change in the shipping industry more generally.

1. **Marks, R. & Osborn, S. (1993). *The vital design link between ship and shore. The importance of co-operation between port planners and naval architects***

Highlights importance of integrated design of ship to shore interface and how this can be achieved. Might be useful in informing the design of zero-carbon ships and ports.

1. **Trace, K. (1995). *Globalisation of liner shipping - implications for Australia.***

Reviews the structure of global liner shipping and concludes that tradition direct services in Australia are at risk because of developments in mainline Northern Hemisphere trades. May be useful in identifying challenges to ports if shipping routes change with the energy transition.

1. **Seserko, L. (2005). *Sustainable transport strategy for Slovenia.***

Makes the case for new high speed railway net as a backbone of Slovene transport network in order to sustain goods and passenger flows. May be useful more generally in informing the design of transport networks around ports.

1. **Atkinson, R. & Baker, L. (1957). *Ships in port.***

Discusses air pollution by ships in port and provides recommendations for improvements. Might be useful in addressing emissions reduction.

1. **Oram, R.B. (1965). *Cargo handling and the modern port.***

Survey of factors that influence working and development of modern port. May have useful principles for designing ports of the future.

1. **Vaudolon, A. (2000). *Liquefied Gases: Marine Transportation and Storage.***

Describes the history and development of marine transport of LPG and LNG. May have useful lessons for the use of alternative fuels in the shipping industry.

1. **Atkin, R. & Rowlinson, M. (1999). *Tug wars! Coming shortly to a port near you? A study of competitive change in the North European towage business.***

Traces historical development of towage market. May be useful in understanding how this sector of the shipping industry might be affected by decarbonisation.

Reviews the structure of global liner shipping and concludes that tradition direct services in Australia are at risk because of developments in mainline Northern Hemisphere trades. May be useful in identifying challenges to ports if shipping routes change with the energy transition.

1. **Van Ham, J.C. & Koppenjan, J.F.M. (2002). *Port expansion and public-private partnership: the case of Rotterdam.***

Explores the difficulites of a public private partnership relating to port expansion. May be useful as case study and can show what actions needs to be taken in order to develop ports.

1. **Hadi-Baaj, M. (2002). *Institutional reforms in Lebanon's commercial ports: opportunities and challenges.***

Gives outline of port development in Beirut from 1887-1998. May be useful in investigating the different port organization models and how they relate to incentives to decarbonize.

1. **OECD Nuclear Energy Agency (1977). *Symposium on the Safety of nuclear ships Symposium sur las Surete des Navires Nucleaires 5-9 December 1977 Hamburg.***

A collection of papers relating to the use of nuclear energy in ships. May be useful in directing the shift to alternative fuels.

1. **Everett, S. (1995). *Privatisation of ports - panacea or politics.***

Explores the effect of privatization and corporatization of ports in Australia and effect on efficiency and competitiveness. May be useful in understanding the governance of ports and how this can be leveraged in zero-carbon transition.

1. **Damaskos, A. (1998). *The FSU and Eastern Europe - potential for privatisation and making ports more market responsive.***

Explores the effect of the breakup of the Soviet Union on access to ports and trade flows. Highlights insufficient facilities and infrastructure as well as state support. May be useful in understanding the role of governments and international organisations in supporting the development of ports.

1. **Compiled by Lars U. Scholl and Merja-Liisa Hinkkanen. (2004). *Research in Maritime History no. 27: Sail and Steam, Selected Maritime Writings of Yrjo Kaukiainen.***

Collection of essays covering topics such as Finnish and international maritime labour in the age of sail, the modernization of Finnish coastal shipping etc. Might have useful case studies as to how the development in technology has shaped the Finnish shipping industry and provides an overview of the economic history of the Finnish maritime sector.

A search for ‘port development’ on the internal publications Google Drive returned a single paper titled ‘**Spatial glocalization in Asian hub port cities: A comparison of Hong Kong and Singapore’ by Lee Sung-Woo and Ducruet César.** This paper discusses the relationship between ports and cities, in particular the impact of city functions on port concentration, concluding that “the cityport is a fragile stage of equilibrium that is likely to be disturbed by inefficient port/urban planning policies locally, and inter-port competition regionally”. This has resulted in the divergent development of Hong Kong and Singapore as port cities – whereas port functions in Hong Kong have moved outside the city, they remain concentrated within the island in Singapore. It would be interesting to see how the dynamics of urban and port development would interact with the shift to alternative fuels as this may change the storage systems and therefore the spatial organisation of ports.

Hinterland

As Weigend (1958) writes, ports are “place of contact between land and maritime space” and serve as “a knot where ocean and inland transport lines meet and intertwine” (p.185). Considering the development of the hinterland is important for understanding port development as technological changes like the use of internal combustion engine have diffused from land to sea, and transport links in the hinterland have often gone hand in hand with port expansion. Hence, I also conducted a search for articles on the hinterland within the HEC collections and internal publications.

A search for ‘hinterland’ in the HEC library returned 10 results. Looking at the title and abstract, I then screened them for relevance on relationship between ports and their hinterlands, looking out especially for whether they highlighted across-cutting technological developments and challenges. I narrowed it down to 6 articles which are listed below. The content of these articles is quite diverse – some focus on port management and habour development and its relationship with the hinterland, and others consider how transport links between the hinterland and port affect port performance.

1. **Gatjens, H-J. (1996). *Requirements made on future container transport systems.***

Discusses anticipated future developments in world containerised transport systems in the context of trade volumes, the structure of the transport chain at sea and in the hinterland.

1. **Lingstad, H. & Uthaug, E. (2003). *Innovative technology: ro-ro vessel terminal and barge design that will improve the cost position and lead-time for the logistic chain.***

Discusses how new vessel constructions for both sea-going vessels and inland barges can improve both sea and hinterland transport, and the implications for cost and lead-time.

1. **Van den Doel, M. (1984). *A modern European harbour complex for the 1990s.***

Discusses prospects for a port complex of the future, highlighting the potential for extensive hinterland connections. Might be useful in understanding how hinterland transport and logistics links can be better integrated into port facilities.

1. **Mai, S. & Zimmermann, C. (2002). *Diked forelands and their importance in coastal zone management.***

Considers characteristics of diked forelands and how they can protect the hinterland in the German Coast. May have implications for the physical development of ports and can guide coastal governance.

1. **Xu, K. (1995). *Strengthening international exchange and cooperation and speeding up building Shanghai into an international shipping center.***

Considers development of Shanghai and its advantages for establishing an international shipping center, especially its vast hinterland. Might be useful as a case study of how to leverage on the hinterland connection.

1. **Jaffar, W.D., Berry, G.A. & Ridley, I. (2005) *Performance management in port authorities.***

Highlights the factors that enable port performance, such as the port hinterland.

A search for ‘hinterland’ within the internal publications folder on Google Drive yielded a single result titled **‘LR in the River Plate Basin’, published in 100A1 Issue 3 1990.** It contains an article on how Uruguay is situated between the great hinterland of the River Plate Basin and Argentina.

**Additional resources:**

Port development

* A search for ‘port development’ on the **Archives Hub (**[**https://archiveshub.jisc.ac.uk/**](https://archiveshub.jisc.ac.uk/)**)** yielded 212 results from various collections ranging from chambers of commerce and corporations. These results included articles on port development strategies and newspaper cuttings on ports being set up.
* Another useful resource for case studies on port development is the **Ports, Past and Present website (**[**https://portspastpresent.eu**](https://portspastpresent.eu)**).** I found the articles on Rosslare particularly interesting as its geographical location – being the closest port to the continental European market – meant that even as Brexit poses a threat to other Welsh ports and the Dublin Port, it is a new opportunity for Rosslare.

Port Cities

* The **International Journal of Maritime History** also has resources on port development and the role of government and policy. A search for “port cities” and “governance” produced 138 results. Some articles which discussed the political economy of the maritime industry are listed below:
	+ - Harlaftis G. Economic and Social Development of the Port Cities of the Sea of Azov and the Greeks in the Long Nineteenth Century: An Introduction. International Journal of Maritime History. 2010;22(1):239-240. doi:10.1177/084387141002200114
		- Kalabinski M. Weaving the port into the socialist city: Fluid connections and transgressive movements in Gdańsk and Gdynia. International Journal of Maritime History. 2021;33(1):178-192. doi:10.1177/0843871421991175
		- Weaving the port into the socialist city: Fluid connections and transgressive movements in Gdańsk and Gdynia
		- Luecke M. ‘American’ Tars: Impressment, citizenship and labour in early Republican New York City. International Journal of Maritime History. 2018;30(4):663-680. doi:10.1177/0843871418796376
		- Dobbs S. The Singapore River, 1819–1869: Cradle of a Maritime Entrepot. International Journal of Maritime History. 2001;13(2):95-118. doi:10.1177/084387140101300208
* The **Port Towns and Urban Cultures blog** - particularly the **Coastal History blog (**[**http://porttowns.port.ac.uk**](http://porttowns.port.ac.uk)**)** has articles on the economic, social and cultural histories of ports and their development.
	+ - There are also case studies on ports like New York (<http://porttowns.port.ac.uk/the-coastal-history-blog-46-watery-new-york/>) which discusses how the waterfronts relate to the larger urban environment
		- See also: **The New York Waterfront: Evolution and Building Culture of the Port and Harbor** which “offers a unique perspective on waterfront building so that the lessons of the past can inform decisions about the future”, and **People, Place, and Power on the Nineteenth-Century Waterfront: Sailortown** which introduces the concept of sailortown as “a place where urban and maritime worlds collide” and how ports have shaped spatial relations in urban centers.

**References**

Weigend, G. G. (1958). Some Elements in the Study of Port Geography. *Geographical Review*, *48*(2), 185–200. https://doi.org/10.2307/212130