Micro-internship at Lloyd's Register Foundation – December 2020

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LITERATURE REVIEW

Goal

- A rapid literature review to scope out the LR archival material and potential future research areas within the seven challenge areas of the foundation
- Narrowed down to looking at technological and skills transfers in the past and the lessons we can learn from these towards tackling decarbonisation across various challenge areas
- Using the currently digitised archival material made available via dropbox to assess its value towards potential research questions in this area
- Supplementing this with other material found online and potential sources available in the Lloyd's register archives that are not available yet digitally

Methodology

- First I acquainted myself with some of the more general history and technical aspects through the published research within the archives notably the 'Maritime science and technology: changing our world' report. This gave a very useful background to understand the more specialised corporate publications within the archives
- I then used the content within the archive dropbox to refine down the research questions I would be interested in to identify the most important documents within the dropbox for these questions as well as to enable more broad searching
- Beyond the dropbox material I did certain keyword searches of the broader LR archive centered around 'technology', 'container', 'containerisation', from these basic search terms a large amount of potentially relevant content came up which I have noted as being of potential use in future research
- I also searched more widely on the websites of key international organisations e.g. the IMO or ITF seafarers as well as various corporate and government publications that were available online

Findings

- There is certainly a strong foundation for greater research into the history of maritime history and shipping that could have direct practical links to current policy making and the challenges of the foundation
- Containerisation especially provides a close historical analogy to the current challenge of decarbonisation and thus has the most to contribute to current challenges
- Containerisation achieved rapid global spread through innovation in the private sector that was constructively standardised and regulated by professional organisations and international ones through the role of the ISO and IMO

    - This spread was systemic with containerisation affecting the whole logistical process from origin to destination requiring not only changes in shipping but an overhaul of port infrastructure as well as within rail and road transport
    - Decarbonisation is a similarly systemic issue that necessitates not only technological innovation in terms of ship propulsion but also zero carbon port infrastructure, new fuelling capacities and green land based transportation
    - This need for integrated decarbonised logistic networks naturally fits with the growth of complex digital systems which make such integration increasingly possible and commercially desirable
- A key differentiating element between containerisation and decarbonisation is how strongly containerisation was driven by economies of scale and the major cost savings that containerisation brought over previous bulk shipping, this has important implications for achieving rapid decarbonisation
    - Economies of scale should be harnessed as far as possible to achieve rapid decarbonisation. The accompanying trend to containerisation has been the expansion of container ships in terms of their TEU capacity and this is a process that can be made to fit with the need to decarbonise through the development of a next generation fleet that incorporates both size and zero or low carbon propulsion e.g. with the development of ammonia fuelled ULCS
    - However decarbonisation will likely never be able to rival the cost saving power of containerisation and thus to achieve the rapid proliferation of zero carbon shipping other strategies beyond reliance on cost incentives will be needed. This could entail social pressures on private firms as well as interventions by private and international regulatory bodies as well as national and regional governments to push the industry in this direction
- The human aspect of decarbonisation is also key with proper regulation and skills training key for safe and effective adoption of new technologies. Such a systemic change to the transport market could also pose new challenges to the labour market and employment where lessons can be learned from containerisation
    - Containerisation proved a mortal challenge to much of the shipping and port based labour market of the 1950s and 60s due to its more capital rather than labour intensive nature
    - This provides a useful case study to see which policy interventions worked to ease labour market strains
    - The shift in the centre of gravity of the shipbuilding industry to East Asia gives opportunities for this region to learn from the painful processes of structural change in the shipping industry married to deindustrialisation that affected western economies from the 1970s. It also presents new challenges of ensuring that technology and skills sharing are global processes that leave none behind in the push to decarbonise
- Summary of potential research directions relevant to decarbonisation
    - How does containerisation inform our understanding of shipping as part of an integrated logistics network and the management of systemic change?
    - How does containerisation connect to geographic changes in the shipping industry (did containerisation encourage this movement or was the move

simply symptomatic of broader economic trends)? What can we learn from the growth of ports and shipbuilding in East Asia and how could such geographic changes factor into decarbonisation?
    - How did containerisation become an effectively regulated and standardised process, what is the best balance of regulation and standardisation to achieve economies of scale versus a looser framework to encourage technological innovation and adoption?
    - How did containerisation affect labour markets and change the role of human capital in the industry? What strategies were adopted to share the skills needed for containerisation on a global scale?

Sources

Digitised content:

- 100A1
    - Probably the most useful more general publication that touches on many of the issues raised by the research questions
- Container Ship Focus
    - Naturally helpful technical publication in relation to container shipping, published from 2005 and thus less relevant to more historical containerisation but useful for assessing industry changes and future directions
- China Focus
    - Interesting for looking at changes in the locus of shipbuilding and how the Chinese market was able to achieve such a rapid rise to prominence since the 1980s - important for understanding how technology and skills transfer and also the key role of the China market for decarbonisation
- Horizons
    - Useful for covering certain technical areas, but in terms of my research question suffers from being a 2000s publication and thus less directly relevant to questions of containerisation
- LR Annual reports and LR Society
    - The Annual reports have a lot of content on the activities of LR and the state of the industry, they might potentially of best use in terms of the quantitative data within them for grounding qualitative explanations of changing fleets with harder evidence
    - The LR Society has a wealth of interesting historical anecdotes and insights into the lives of those working at LR, in terms of more technically focused research questions it is of less use however

Potentially useful sources from the LR archive:

- Report of the Technology Transfer Working Group - Inter-Agency Committee on Marine Science and Technology - April 1994

    - Learning from previous ideas of best practice of technology transfer and comparing/contrasting that with current industry practices and trends
- Made in China: What impact will the burgeoning capacity and enhanced technical capability of Chinese yards have on the roro market? - J Dong - 2000 Lloyd's List Events
    - Understanding the transition of shipbuilding capacity to East Asia and what lessons can be learned from how skills and technology accompanied this movement of capacity
- Annual of the Chinese Society of Naval Architecture and Marine Engineering Volume 1 - Shipbuilding of China - 1982
    - The importance of professional networks to skills and technology sharing, and the two way nature of this interchange - crucial to the international cooperation that will be needed with decarbonisation technology
- Henry S Marcus - Planning ship replacement in the containerization era - 1974
    - Understanding how shipping businesses coped with the challenge of fleet replacement during containerisation, what can be learned from this experience to achieve an even faster fleet replacement
- Containerization: the key to low-cost transport - McKinsey & Company report commissioned by the British Transport Docks Board - 1967
    - Potentially useful insight into how containerisation was understood at the precipice of its global expansion, has also been followed up by another 2017 report on shipping by McKinsey though this rather neglects decarbonisation

Other potential sources:

- Documents and reports from the various international agencies involved in containerisation - IMO, Institute of International Container Lessors (IICL), ISO and their involvement in standardisation
- 'Off the Waterfront: The long-run impact of technological change on dock workers' - Zouheir El-Sahli, Lund University, and Richard Upward, University of Nottingham
    - Interesting work of political science on the labour impacts of containerisation and how policy intervention through a job guarantee system introduced in 1970 lessened the negative labour market outcomes of dock workers relative to less supported groups during the process of deindustrialisation in the UK, even though mass redundancies become common after the abolition of this system in 1989
    - This article plugs into a broader literature around labour questions and disputes during containerisation that could be an interesting research angle