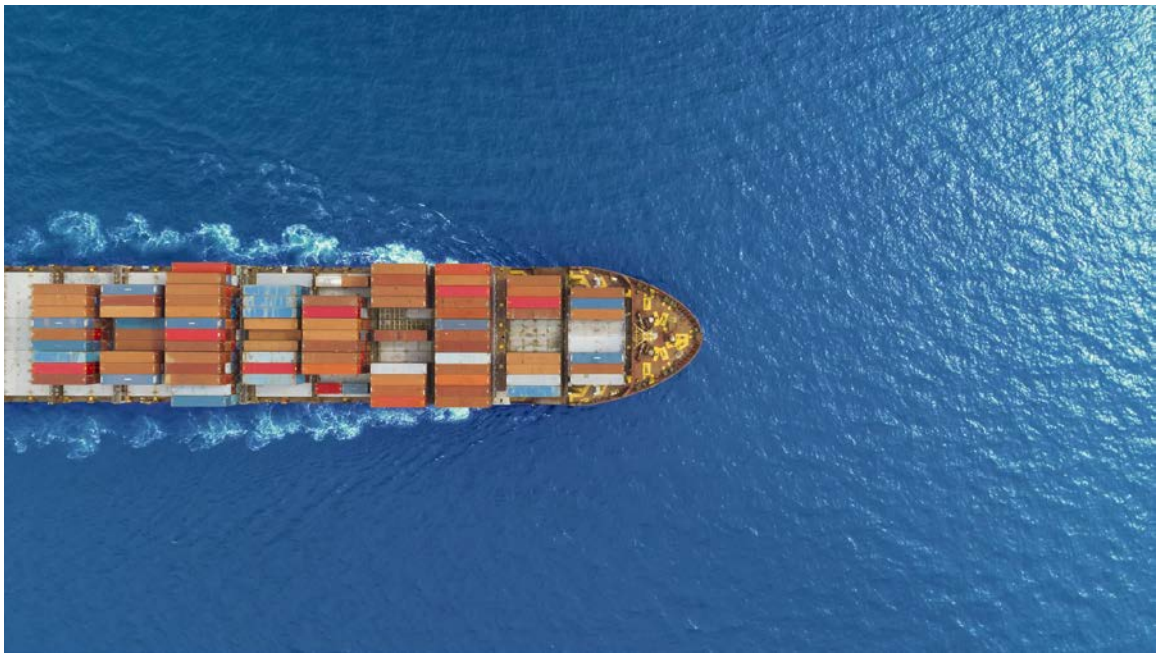

SUMMARY

Market-based measures for shipping decarbonization: policy designs, impacts and avenues for future research

A recent Journal of Transport Policy article "Policies focusing on market-based measures towards shipping decarbonization: Designs, impacts and avenues for future research"[1] presents a comprehensive literature review of the peer-reviewed research that investigates maritime decarbonisation policy options, e.g. rules, regulations and market-based measures. The research in this field is motivated by the political consensus that reducing carbon dioxide emissions is inevitable for achieving low- or zero-carbon shipping for ensuring the sustainability of the sector. The **article addresses** the design, impacts, and areas for future research of these broader policy options using the approach of bibliometric review, which is a methodology that relies on identifying bibliographic connections between published scientific papers instead of the usual way of finding links in content analysis. The review includes 75 relevant articles from 45 publications covering the period between 2009 and 2021.

The **value of this research** lies in the clustered analysis of the literature, and the links that the authors are drawing with supranational policy developments that have occurred in the analysed time period. (Figure 1) The authors identify three clusters that the papers cover.

[1] Chen S., Zheng S. & Sys C. (2023) *Policies focusing on market-based measures towards shipping decarbonization: Designs, impacts and avenues for future research*. Transport Policy 137, pp. 109–24. Available at https://doi.org/10.1016/j.tranpol.2023.04.006.

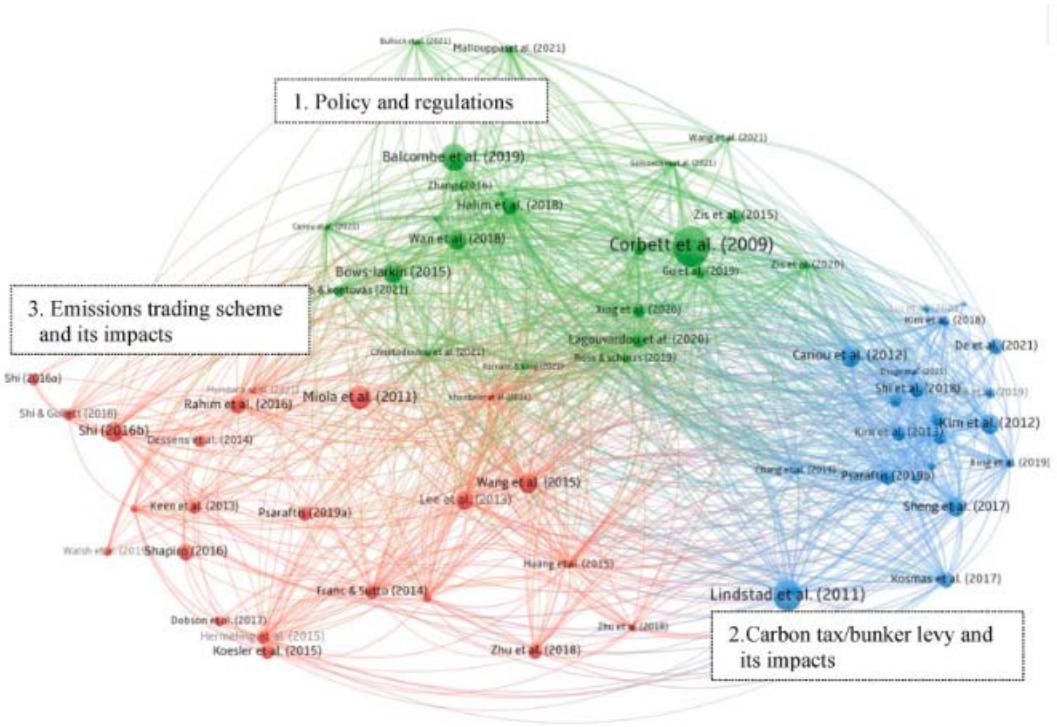

Figure 1. Bibliographic coupling

The **first cluster** is the largest and includes those articles that present a review of policies and market-based measures for decarbonising maritime transport either on the global or regional level. On the **global level,** IMO is responsible for developing standards for shipping and has adopted a series of nine measures since 1997, with some in the proposal stage. Some of those are discussed and criticised in the literature, e.g. Energy Efficiency Design Index (EEDI) because its requirements can easily be satisfied by the reduction of ship design speed. Some solutions are proposed for the shortcomings of those measures are also proposed. At the **regional level**, the EU has introduced different measures to reduce emissions, including the world's first emissions trading scheme in 2005 (ETS), the requirement for member states to provide LNG infrastructure and shore power, and the inclusion of shipping in the EU Emissions Trading System.

The **second cluster** includes articles related to the topic of a **bunker levy or carbon tax**, which is a policy to levy tax on the volume of bunker fuel consumption. The advantages of the carbon tax are its breadth, simplicity and less uncertainty about its level, and its compatibility with the "polluter pays" principle, therefore it is widely accepted in the literature, despite its nature of extraterritorial policy action, bureaucracy and financial costs. The effectiveness of carbon tax is disputed by some authors due to effects that would come from the wider application of slow steaming with consequent higher demand for ship capacity, which would not necessarily have better environmental performance. The speed limits, as an alternative to carbon tax, are not recommended.

Concerning the design details of carbon tax, the predominant view is that it should be introduced globally, because regional implementation can easily be circumvented by optimised bunkering strategies. For easier implementation in practice, due to expectation that the IMO agreement procedure will be too slow, literature suggests hybrid taxation mechanisms.

The economic impacts of carbon tax, despite it favouring trade of shorter distances, will unlikely be significant. Additional optimising of shipping networks is expected. There are fears, as usual with extra costs or taxation, that the overall profit in the industry might be reduced if all costs cannot be passed on to the shippers. In the long-term carbon tax can be incentivising for technological innovation and investment in energy-carbon-efficient fleet. Figure 2 summarizes the research framework in Cluster 2.

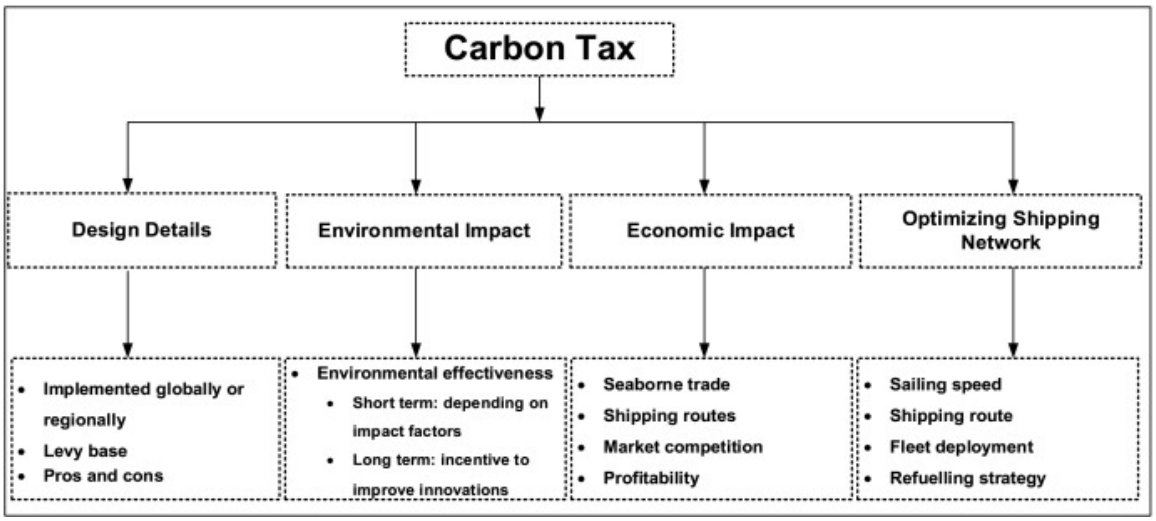

Figure 2. Research framework in Cluster 2 (Chen, Zheng & Sys, 2023)

The **third cluster** includes articles focusing on **emissions trading schemes** (ETS) and their impacts, where ETS is a “cap and trade” system that limits emission levels and puts the quotas for sale at market prices. The majority of quantitative and qualitative research demonstrates that implementing ETS would significantly cut emissions. It would encourage shipping operators to save fuel due to increased cost, with short-term measures like slow steaming and network optimization, and long-term investments in innovative technologies, energy-efficient ships and renewable fuels. The research framework can be seen in figure 3.

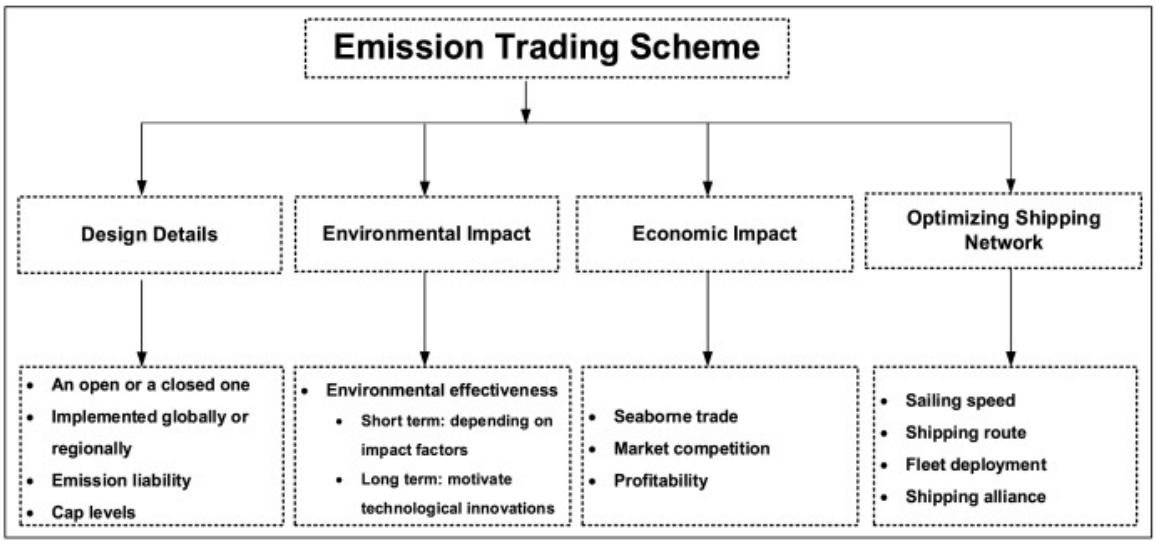

Figure 3. Research framework in Cluster 3 (Chen, Zheng & Sys, 2023)

The design of the system could be limited to shipping only or allow trading of emissions with other industries. The latter is preferred in the literature due to cost-effectiveness, market transparency and system stability. The question on what the cap level of emissions should be, and whether it should be fixed or depend on specific market conditions or ship characteristics is also discussed. On the geographical scope, most scholars favour a global maritime ETS instead of a regional one, e.g., in the EU such a system could lead to market distortions. If a regional ETS is introduced, an option could be to apply it to entire routes where one of the ports is inside ETS, but this leaves space for avoiding the scheme by transhipment in ports close, but outside the ETS region.

When **comparing ETS and Carbon tax** (second and third cluster) it is recognised that both approaches may reduce emissions by motivating short- and long-term actions. The strengths of carbon tax are its simplicity, breadth, compliance with the “polluter pays” principle and predictable tax level. But its disadvantages are related to extraterritorial policy action, data unavailability on emissions, monitoring and verification involving bureaucracy and financial costs, and possible carbon leakage for unilateral taxation. The challenges of ETS are in its cap levels, volatile carbon pricing and emission allowances.

The **authors conclude** that theoretical research on policies and market-based measures aimed at decarbonisation of maritime transport is still at an early stage, as shown by the increase of publications in the field. The reviewed literature indicates that price-control approaches (i.e. carbon tax) are preferable to quantity-control approaches (i.e. ETS) considering policy design details, administrative burden, regulatory coherence, carbon market stability and incentives to technological innovations.

The authors of the paper identify the need for **further research** in the areas of policy design, impacts of policies on the firms and their reactions in the different niches of

shipping market, and the lessons that can be learned from decarbonization efforts in other transport modes.

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Summary written by Prof. dr. Shun Chen, Prof. dr. Christa Sys and dr. Raimonds Aronietis in framework of 3rd shipping event organized by BNP Paribas Fortis Chair Transport, Logistics and Ports

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