TAKE-UP OF INNOVATIVE ENERGY EFFICIENCY TECHNOLOGIES IN MARITIME TRANSPORT

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Abstract

The maritime sector has seen a rapid growth in the number of innovative technologies that can help to improve the fuel efficiency and the emissions of the sector. These have ranged from design based technologies to alternative fuels and from hydrodynamic technologies to new maintenance regimes. Against a backdrop of highly volatile fuel prices, regulatory changes, such as the introduction of EEDI and ECA's and unstable market conditions the proliferation of these technologies has increased yet their true uptake has been relatively less understood. Using a cross-sectional survey method, this paper attempts to bridge this knowledge gap by looking at the implementation of these innovative energy efficiency technologies in three key sectors, tanker, drybulk and containerships. The results show that there is significant heterogeneity in the market, with the drybulk sector having higher take-up of the technologies investigated in this paper.

Objective

The objective of this research is to create a detailed picture of the implementation of innovative energy efficiency technologies in maritime transport, which can be disaggregated at different levels, such as at the ship level, sectoral and the firm level to reflect the heterogeneous nature of maritime transport. The data is also used to calibrate the GloTraM model, a holistic model to better understand the shipping system including the relationship between its principal components, transport logistics and ship design.

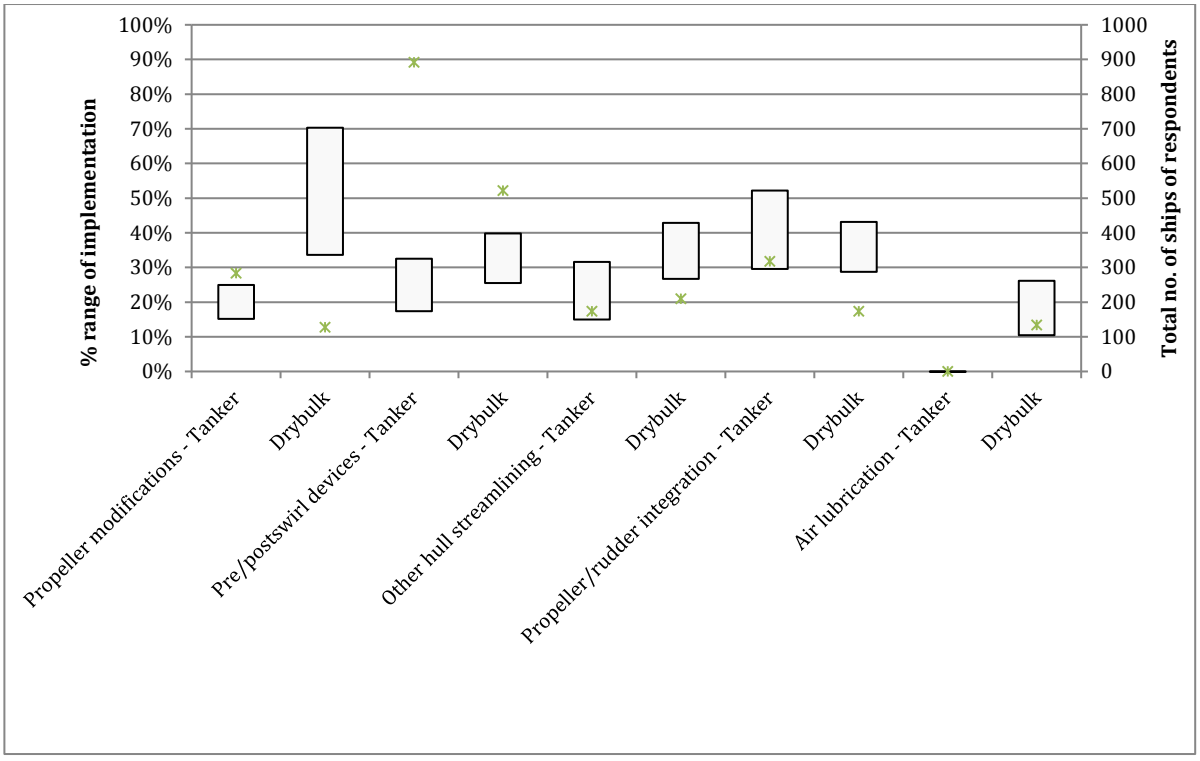
Data/Methodology

The research uses data gathered from a cross-sectional online survey of shipping companies (owner-operators, operators, management companies and long term time charterers) deployed using the Tailored Design Method (Dillman 2009). The survey uses a census

approach for large firms (50+ ships) (due to their limited number) and stratified sampling approach for the rest of the firms using the Clarksons Shipping Information Network database, stratified according to region, sector and size. The survey received 275 responses in total representing almost 20% of the wetbulk, drybulk and container fleet (approximately 5,500 ships out of 28,000 ships according to Third IMO GHG Study).

Results/Findings

The survey covered almost fifty energy efficiency technologies. This section presents only a subset of the results and for some of the hydrodynamic technologies only. The results presented here show the take-up of technologies for firms that operate solely in one sector i.e. tanker, and drybulk[1]. Figure 1 shows that the take-up of five energy efficiency technologies differs by sector. On average the technologies are taken up more in the drybulk sector relative to the tanker sector, for example pre/post swirl devices was implemented between 17% to 33% of 892 tankers compared to 25% to 40% of 522 drybulk ships. Air lubrication had implementation which ranged between 1 – 5 ships of the responding companys' fleet, suggesting that the technology is still being trialed predominantly in the drybulk ships, given their higher frictional resistance due to their hull forms.



[1] Data on other sectors and mixed fleet firms is also available

Figure 1: Implementation of hydrodynamic energy efficiency technologies

Implications for Research/Policy

The maritime sector has to date been left to the designated UN body in key global environmental policies e.g. Paris Agreement. Whilst there has been progress made at the International Maritime Organisation, e.g. EEDI and SEEMP, it is evident that these policies will not be enough to lead towards a low carbon trajectory and at best will lead to stabilization of emissions in 2050 of 2012 levels (Smith et al. 2014). There is thus increasing pressure on the IMO to deliver on emissions reductions that are going to be in line with what has been recently agreed at the UNFCCC. This will require much more take-up of innovative technologies than currently spurred by the EEDI and tough market conditions. Two factors may contribute towards increased take-up of innovative energy efficiency technologies. A review of the EEDI stringency levels and a long-term CO_2 emissions objective, both currently in progress at the IMO, could have profound impact on the take-up of the innovative technologies.

Keywords: technologies, energy efficiency, implementation, diffusion