
Technology Adoption Review

Department for Science, Innovation & Technology

UK National Clean Maritime Research Hub's response 14 February 2025

The UK National Clean Maritime Research Hub is focusing on research at lower technology readiness levels to inform future research, development and deployment. Through collaboration with stakeholders from across the maritime sector, the Hub aims to drive forward innovation and transformation, establishing the UK's competitive advantage by setting a global benchmark for excellence.

Website: <https://www.clean-maritime-research-hub.org/>

Current situation

1. Why does the UK rank lower than some OECD countries in technology adoption? What dynamics exist in the UK, but not in countries such as Germany or Estonia that might explain it?

SME businesses make up 99.8% of the UK private sector businesses. But a lack of resources and digital skills among SMEs contributes towards not performing as well as some other OECD countries. The Estonian government for example, has invested heavily in digital governance, and internet connectivity infrastructure that supports greater technology adoption.

In the case of maritime technology, Estonia has high levels of national leadership and academic conferences that supports greater technological development activity and adoption.

2. What are the biggest barriers to technology adoption in your sector and/or across sectors? Does business size and geographic location affect how firms are impacted by these barriers?

From a university perspective, there are high capital costs associated with technology adoption, requiring significant investment in infrastructure digital systems. Some universities struggle to afford such investments. There is a risk of UK universities lagging other countries in technical competence if a lack of investment continues.

3. What is the evidence for technology adoption across different sizes of businesses?

In the retail sector there are many examples of technology adoption such as online shopping and delivery platforms.

Hydrogen (H₂) technologies are very important in decarbonising the maritime sector and other transport modes. For H₂ technology we are seeing small companies developing at the product or component level and larger organisations focusing more on system level innovation.

4. What are the differences in technology adoption rates in the nations and regions of UK and how can they be explained?

Digital technology adoption is much higher in urban areas, most notably South East England compared to other places in the UK. This could be due to its proximity to London, where there is a concentration of national banking and financial services activity, a sector that greatly benefits from digitalisation. Relatively poorer internet connection in rural areas can inhibit digital technology

adoption among local businesses. Adoption rates of different technologies tend to be predicated on the available technology or supply chain in a location or area, i.e. financial services in London and manufacturing in the Midlands.

5. Do technology adoption rates differ at a worker level, including by gender, ethnicity or other protected characteristics? If so, does this have wider effects on professions and sectors where a large proportion of that workforce comes from a lower technology adopting group?

Digital technology adoption tends to be more sensitive to age, disability, and socio-economic factors rather than gender and ethnicity. Older people can be more resistant to lifestyle change and people with disabilities often face difficulties in adopting consumer-focused technological designs aimed for the masses (smartphones). The lack of financial means in lower socio-economic classes inhibits access to the latest technology, that only affluent early adopters can afford.

Existing measures

6. How effectively does the UK support the adoption of new technology? What could be improved in your sector and/or across sectors?

In the maritime sector, the UK has been a leading state in the negotiations at an international level (IMO) for the implementation of regulations and policies that could accelerate the adoption of new technologies in relation to net zero fuels and the transition to net zero shipping.

In the higher education sector, there is good support in general, but this could be improved. Government grants and funds like Innovate UK and digital upskilling initiatives like Digital Skills Partnership are good existing initiatives by the government.

In general, there is a lack of high-risk funding opportunities in the UK. Other countries provide more support to research and development projects that have a potentially high value but are high risk.

7. What current policies and/or initiatives support technology adoption in your sector and/or across sectors?

In the higher education sector, there are research and technology development grants available such as Innovate UK and EPSRC grants. Universities have programmes to support commercialising technologies developed by researchers and knowledge transfer partnerships with businesses.

In commercialising technologies that have been developed in universities it can be challenging to identify investment partners or manufacturers due to a lack of funds and risk averseness already highlighted. In the Clean Maritime Research Hub our researchers have developed a safe hydrogen storage technology that will not rupture in a fire. This is a key technology for a low carbon economy and applicable across transport modes and in refuelling stations. It is proving very difficult to find a suitable UK manufacturer who can invest in producing storage tanks with this new technology. There is a risk that the economic value of such important UK intellectual property such as this will go to other countries.

There are innovative knowledge transfer partnerships between regional and national government and universities. For example, Arrow Innovation¹ provides SMEs in North East England with access to academic expertise from universities in the region (Durham, Newcastle, Northumbria, and Sunderland) to support development of an innovation to that business. The aim being to leverage academic expertise to enhance economic growth in the region through funding from the national government, North East Combined Authority, and Durham County Council.

8. The availability of skilled employees is a significant enabler of technology adoption. What are the main skills needs across the economy/in your sector required to drive technology adoption and where are the most significant gaps?

In the maritime sector there will be a need for enhanced technology skills where there could be increased automation of services at ports for example. The safe and effective handling of alternative fuels and understanding of associated engine technologies will also be required on ships.

Technology upskilling of workers can happen more effectively when change impacts are more visible and quantified, i.e. case studies on process time reductions, return on investment, etc. Without strong government signals about future industries, it can be difficult for prospective students to make decisions on developing skills for the future, or businesses to invest in them. Further exacerbating skills gaps in say renewable energy industry.

In the university sector, the role of AI in learning needs to have broader understanding as to limitations and drawbacks.

9. What international examples of technology adoption have been most successful, specifically from countries with economies similar to the UK and/or any novel or effective approaches from other countries?

Iceland and Norway, in terms of adopting renewable energy for power generation.

Future action to drive technology adoption

10. What are the top two transformational technologies for productivity in your sector and/or across sectors and why?

In the university sector the use of online meetings has been embraced. This has enabled efficient communication between colleagues and collaborators internationally, and flexibility in teaching without the need to travel for commuting students. AI is another powerful tool that is used to check for plagiarism in students written work.

11. Where is government uniquely placed to drive technology adoption?

The government has many options for driving technology adoption. These include policies, initiatives, strategies signalling intentions and targets, and information campaigns to encourage widespread adoption. Through grants and financial incentives, the government can act to reduce the risk of investments in technology and therefore encourage further investment and adoption. Tax

¹ <https://arrowinnovation.org.uk/>

incentives and support grants for SMEs can stimulate further development of novel technologies and associated supply chains.

12. Where is industry uniquely placed to drive technology adoption in your sector and/or across sectors? Where could industry go further to support the objectives of this review?

Through academia-industry partnerships for developing novel technologies through startup companies.

13. What opportunities are there for government and industry partnerships to drive technology adoption in your sector and/or across sectors?

Micro-grants and/or loans to develop proof of concept prototypes and patent support for SMEs in developing novel technologies. This could be a more widespread version of the previous Energy Entrepreneur's' Fund for example.

14. What approach or policies should government consider to accelerate technology adoption across the economy and/or within sectors?

By facilitating an open-access platform to encourage and allow the public to invest in SMEs with high growth potential that has been established following a research or commercialisation grant. This could encourage more public engagement with home grown startups and facilitate more risk-taking behaviours and investment activity.

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