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POLICY BRIEFING

Advanced technology adoption in UK SMEs: what is the effect of external knowledge sources and what are the productivity outcomes?

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Introduction / Summary

The ongoing diffusion of advanced and emerging technologies (AET), including artificial intelligence, robotics, automation and virtual/augmented reality, have ignited important debates amongst policy makers, academics and business managers alike, due to their wider socio-economic implications which are yet to be fully understood. While AET have been mostly associated with large, multinational corporations, there has been increased focus on how these technologies are being used by smaller firms, including small- and medium-sized enterprise (SMEs). Since the start of the decade, SMEs have been catching up with larger firms in adopting digital technologies more broadly, such as social media and cloud computing services; yet, many SMEs continue to lack the resources and skills needed to fully exploit these technologies' potential. Importantly, AET are somewhat even more advanced in their capabilities and transformative potential, but less is known about their uptake in SMEs to date.

This warrants further investigation, especially in a UK context with the UK aiming to strategically position itself as a global AI powerhouse as part of its wider *National AI strategy*, published in 2021. Specifically, the UK Government's National AI Strategy identifies the diffusion of AI across the economy as a strategic priority and explicitly emphasises the need for SMEs, alongside start-ups and larger firms, to have access to the people, knowledge and infrastructure required to respond to AI-driven technological change. As of 2024, SMEs account for over 99,2% of the UK business population, therefore representing the economic backbone of the country and requiring dedicated attention and policy support.

SMEs are a highly heterogenous group and it may be down to firm-specific factors that explain why some SMEs engage in AET adoption over others. Specifically, external information and advice, e.g., from consultants, professional networks, or government support agencies, may encourage AET uptake amongst SMEs by providing expertise, guidance, and insights on industry 'best practice'. Firms may access different sources of external knowledge and advice, including industry bodies and trade associations, research institutions such as universities as well as government support agencies. Moreover, the underlying reasons for seeking external knowledge and advice may differ; SME managers may seek external knowledge for different reasons and on different topics, such as innovation, legal issues and leadership development. Hence, it is not only relevant to understand whether firms use external information/advice, but also for what reason and from whom. Finally, understanding the drivers of AET adoption in UK SMEs alone may not produce policy-relevant insights, unless AET adoption brings clear benefits to firms. Hence, understanding the association between AET adoption and potential productivity implications is also of high interest. Against this backdrop, the present research was guided by three interrelated research questions:

- Research Question 1: Is the use of external knowledge associated with the adoption of advanced and emerging technologies (AET) among UK SMEs?
- Research Question 2: How do the sources and purposes of external knowledge use relate to AET adoption among UK SMEs?
- Research Question 3: Is AET adoption associated with productivity among UK SMEs?

To answer these research questions empirically, secondary analysis of the Longitudinal Small Business Survey (LSBS) was employed. The LSBS has been annually conducted by the Department for Business and Trade (DBT) since 2015. The survey is the largest and most comprehensive survey of SMEs within the UK and offers extensive and systematic insights into firms' characteristics, including their innovation performance, growth ambitions, turnover and exporting. Notably, it also contains key variables relevant to this research paper. Overall, this research highlights the important role of external information and advice in AET adoption, with firms using such knowledge showing a higher likelihood of AET adoption. Importantly, both the reason and source of external information and advice appear to matter. While AET adoption alone does not show a robust association with labour productivity, the findings suggest that strengthening SMEs' access to relevant external knowledge and ensuring that this support is aligned with firms' innovation and efficiency needs, may be an important part of supporting the wider diffusion of AET.

Key Findings

The following key findings emerge from this research. First, between 2018 and 2021, only a small share of UK SMEs adopted AET, roughly 6.8% of the sample. In turn, the use of external information and advice was relatively stable, ranging between ca. 31% and 33% of firm-year observations. We focus on three possible reasons for using external information/advice, namely, (1) Improving efficiency/ productivity, (2) E-commerce/ Technology and (3) Innovation, as these reasons closely align with AET adoption. Similarly, despite the broad spectrum of possible sources for external information/advice, we focus here on: (1) Government Support (chamber of commerce, GOV website and local council/authority); (2) Professional Advisers (accountant; consultant/general business adviser; financial adviser; solicitor/ lawyer) and (3) Business & Education (business networks/trade associations; local enterprise partnerships; universities/ education sector). Across the sample, the main reason to use external information/advice was to improve business efficiency/productivity, while the dominant source of external information/advice pertains to professional advisers. Second, firms using external information/advice had an approximately 2.8 percentage-point higher predicted probability of AET adoption than non-users after accounting for other relevant firm-level characteristics. Notably, this statically significant positive relationship remains in the propensity-score-matched sample, where firms using external information/advice had an approximately 3.9 percentage-point higher predicted probability of AET adoption than non-users. Across different model specifications, we also found R&D activity to be a consistent driver of AET adoption, suggesting the importance of firms' internal and external knowledge base for AET adoption. Moreover, among firms using external information/advice, AET adoption was particularly associated with using advice for innovation and efficiency/productivity purposes and with obtaining advice from professional services and business/education sources. In contrast and interestingly, government support was not significantly associated with AET adoption. Finally, AET adoption was initially associated with higher labour productivity, but this significant association diminished after matching. External information/advice, however, remained positively associated with labour productivity across all models.

Key Findings at a Glance

- Finding one: Between 2018 and 2021, only a small share of UK SMEs adopted AET, roughly 6.8% of the sample.
- Finding two: Firms using external information/advice had an approximately 2.8 percentage-point higher predicted probability of AET adoption than non-users, after accounting for other firm-level characteristics.
- Finding three: Firms using external information/advice had an approximately 3.9 percentage-point higher predicted probability of AET adoption than non-users in the propensity-score-matched sample.
- Finding four: Among firms using external information/advice, AET adoption was particularly associated with using advice for innovation and efficiency purposes, and with obtaining advice from professional services and business/education sources.
- Finding five: AET adoption was initially associated with higher labour productivity, but this association was no longer statistically significant after matching, while external information/advice remained positively associated with labour productivity.

Key Insight

Despite low AET uptake overall, there is a positive and statistically significant association between the use of external information/advice and AET adoption amongst UK SMEs.

Conclusions and Policy Recommendations

Summary of Key Findings

This research empirically examined whether the use of external knowledge, including information and advice, is associated with the adoption of AET among UK SMEs. The findings offer consistent support for a positive and statistically significant association between the two. However, it should be considered that during the studied period, only a small share of UK SMEs actually adopted AET, namely roughly 6.8% of the sample. Thus, while AET adoption was associated with using external knowledge, policy efforts should (1) target understanding what drives the low AET uptake amongst AET, (2) alongside facilitating SME access to relevant external networks which may encourage AET uptake. Additionally, we found R&D activity to be a consistent driver of AET adoption. Overall, policy intervention should focus on fostering external engagement in knowledge seeking activities, whilst in parallel, increasing access to sources of knowledge and advice.

This research also explored how the sources and purposes of external knowledge use relate to AET adoption. Testing for three different reasons behind using external knowledge, the empirical findings suggest that (1) efficiency and (2) innovation are positive and significant reasons. In contrast, using external information/advice for technology/e-commerce purposes was not found to be significantly associated with AET adoption. Together, these findings suggest that the underlying reasons for using external information/advice matter. In this regard, we also tested for different possible sources of external knowledge, building on previous research which highlights that some external sources may be more useful than others. According to the findings, the use of professional services is positively and significantly associated with AET adoption, as is obtaining information/advice from business and education sources. However, government support is not significantly associated with AET adoption.

These findings suggest that policies aimed at supporting AET diffusion among SMEs should consider not only whether firms have access to external information and advice, but also the sources through which such knowledge is provided and the purposes it serves. Targeted policy efforts could focus on facilitating links between SMEs and professional advisers, business networks and educational institutions. Government-supported programmes such as *Help to Grow: Management courses* (through the Small Business Charter) for example, illustrate how public support can connect SMEs with UK business schools and university-based expertise. At the same time, the absence of a significant association for government support (chamber of commerce, GOV website and local council/authority) in our analysis suggests a need to better understand how existing public sources of information and advice connect with SMEs' AET adoption needs, rather than assuming that the provision of government information or advice alone will suffice. Finally, the importance of innovation and efficiency motivations suggests that support for AET adoption may be particularly relevant when it is connected to firms' wider innovation activities, which is also consistent with our finding that R&D activity is a key driver of AET adoption.

This research report also asked whether AET adoption is associated with productivity among UK SMEs. The findings in this regard are less clear, given that in the full sample there is a significant positive association, but not in the matched sample. The loss of statistical significance in the matched sample warrants consideration. Yet, our dependent variable here only allows us to consider whether – or not – a firm adopted AET, meaning that we have no information on AET intensity and AET investments made by firms which may matter for productivity gains. Thus, further research is needed to tease out the intricacies associated with the seemingly complex relationship between AET adoption and productivity implications.

Overall Conclusion

While AET adoption alone does not show a robust association with labour productivity, the findings overall suggest that strengthening SMEs' access to relevant external knowledge, and ensuring that this support is aligned with firms' innovation and efficiency needs, may be an important part of supporting the wider diffusion of AET amongst UK SMEs.

Policy Recommendations

1. Policy Recommendation 1: Strengthen SMEs' access to relevant external knowledge and advice. Policy initiatives aimed at increasing AET adoption should facilitate SMEs' engagement with external knowledge providers, given the consistent positive association between the use of external information/advice and AET adoption.
2. Policy Recommendation 2: Connect SMEs with relevant professional, business and education-based knowledge sources. The positive associations identified for professional services and business/education sources suggest that policy support could facilitate stronger links between SMEs and professional advisers, business networks, universities and business schools. Existing initiatives such as Help to Grow: Management illustrate how government-supported programmes can help create such connections.
3. Policy Recommendation 3: Align AET support with firms' innovation and efficiency needs. External information/advice used for innovation and efficiency/productivity purposes was particularly associated with AET adoption. Policy initiatives should therefore consider embedding AET support within firms' broader innovation and productivity activities, including efforts to strengthen R&D activity, rather than treating technology adoption as an isolated objective.

Practical Recommendations

4. Practical Recommendation 1: The lack of a significant association for government information/advice sources points to a need to better and systematically understand how existing public support connects with SMEs' AET adoption needs. Liaising with local Chambers of Commerce which often hold links with local SMEs may be a good starting point to better align what SMEs need for AET adoption and what government support-based sources assume and can offer.
5. Practical Recommendation 2: SMEs should be encouraged to consider AET adoption as more than a binary decision in terms of whether - or not - to adopt a particular type of AET. Given that AET adoption was not robustly associated with higher labour productivity in our analysis, practical policy support should encourage SMEs to consider the wider investments and complementary resources required to successfully integrate AET into their business activities and to realise potential productivity benefits.

Directions for Future Research

Future research should further investigate the relationship between AET adoption and productivity among UK SMEs. In particular, funding opportunities should be targeted at research which moves beyond binary measures of whether firms adopt AET and which instead examines the intensity of adoption, the level of investment in AET, and the complementary resources and investments that may be required for firms to realise productivity gains. While the present research dissected AET into AI and VR/AR technologies, both of which were more likely to be adopted when firms used external knowledge, LSBS data in its present form offers little insights into other relevant measures pertaining to AET.

Additionally, more recent data, including qualitative data (such as case studies), would also be valuable given the rapid development and diffusion of AET particularly in recent years. Actively advertising and funding research that captures the more nuanced and recent dimensions of AET adoption would help policy makers and SME managers better understand when and under what conditions AET adoption translates into tangible benefits, such as productivity gains.

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