

Technology adoption and skills in UK firms: Survey Results¹

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Background

Technologies such as Artificial Intelligence (AI), robotics and the use of big data have promised much in terms of improvements in the way firms do business. Until the launch of ChatGPT in early 2023, there had been relatively slow adoption of these technologies, except in pockets of firms usually concentrated in high-tech sectors. And yet, there is an expectation that they will transform the world, both in terms of the workplace and wider society.

Here, we present preliminary findings from a survey of UK firms, conducted in 2023 to elicit whether and how technology adoption is taking place. Specifically, we are concerned with whether there is a clear productivity objective from technology adoption, and if skills in the labour force are acting as a driver or a barrier to adoption.

Responses

Our survey was conducted during Autumn 2023 and we are grateful to all participants that took part. We received survey responses from around 1,000 unique enterprises. After preliminary data cleansing (with the removal of surveys with little or no data), our sample reduced to 827 responses. Removal of outliers led to a final sample of 825. However, not all questions were answered by all respondents, leading to variations in sample sizes when we present our findings by question. Table 1 provides some descriptives of the surveyed sample.

Table 1: Description of survey sample.

Variable	%	Total N
Young firm (< mean age)	48.57	838
Large firm (> mean size)	58.71	838
Engaged in any technology	70.19	671
High productivity (>mean labour productivity)	63.48	838

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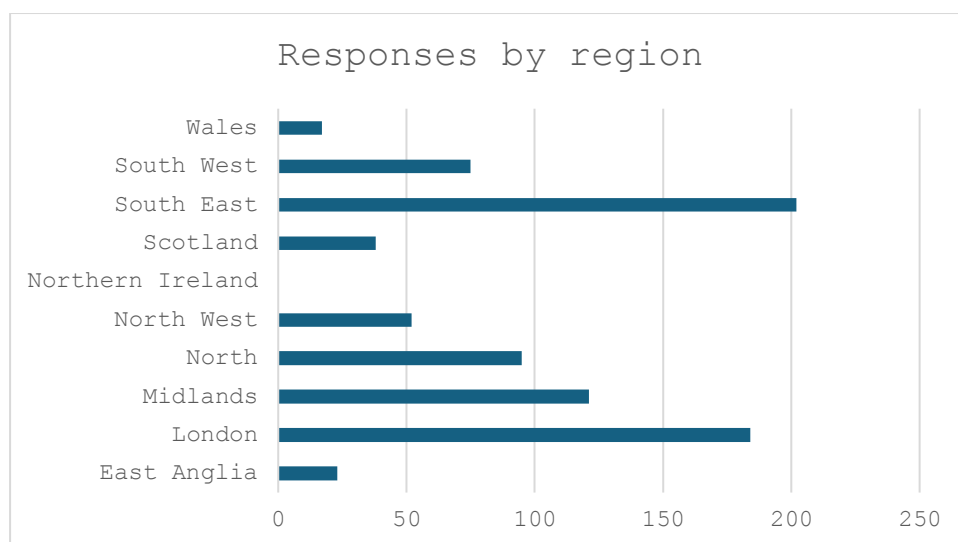
Profile of respondents

In line with the UK business structure, our sample is dominated by small firms with an average number of employees of 51. 75% of firms are single plant/location entities. The average age of firms in our sample is 23 years. In almost 70% of cases, businesses are run by their founder, with a further 10% of businesses being led by an employee from the business operation. We gathered information on organisations' attitudes towards innovation and their management structures, as well as their expectations regarding future growth. The following section provides a summary of our findings in relation to technology, performance and skills.

In terms of activity, a wide range of sectors are included in the sample, with services dominating. Getting a clear picture of coverage is difficult, however, as descriptions are varied. There is some evidence of a significant proportion of respondents self-describing as management/business consultants and accounting firms, which would suggest an overrepresentation of this sector. However, sectoral analysis will only be possible with the matched proportion of our data.

Regionally, our sample covers much of the UK, including Northern Ireland, Wales and Scotland. Data in Figure 1 provide an overview of the geographical spread of survey responses, which are not dramatically different from national distributions of economic activity, albeit with relatively small numbers. We recognise that our survey represents a snapshot of UK firms and is not wholly representative of the UK firm population, it does however provide a good indication of the uptake of technologies and potential barriers.

Figure 1: Responses by region



Notes: N=838; Northern Ireland data not reported due to small sample size and region unspecified not reported.

Figures 2, 3 and 4 reveal the regional differences in uptake of technologies (split into AI, Robotics and Big Data). Given that we recognised the predominance of services

in terms of sector distribution, low levels of robotics uptake and high levels of AI uptake are not surprising. AI adoption ranges from 75% of respondents in London to 51% in the North West of England. In the case of big data, we see that unlike AI, the majority of responding firms do not report engaging with that form of technology, and the region with the lowest reported engagement with Big Data is Scotland. For robotics, the non-adopters are even more pronounced. Robotics are more likely to work for manufacturing firms and therefore, this sectoral 'bias' is likely to lead to fewer firms using it. Adoption of robotics is highest in East Anglia, with approximately 37% of firms engaging (Cambridge tech?).

Figure 2: AI adoption by region (%of respondents)

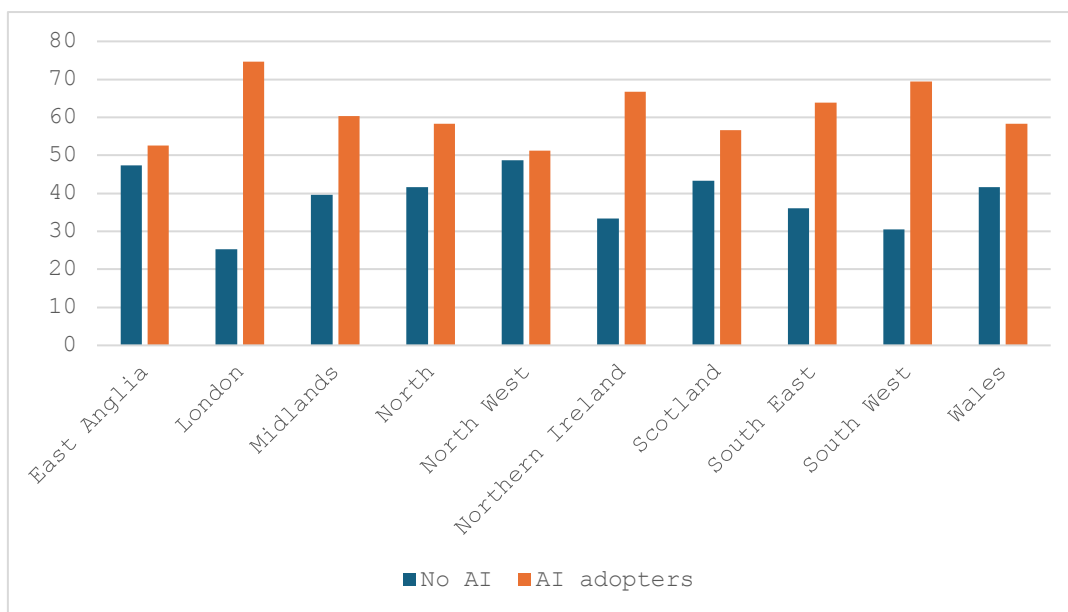


Figure 3: Big Data adoption by region (% of respondents)

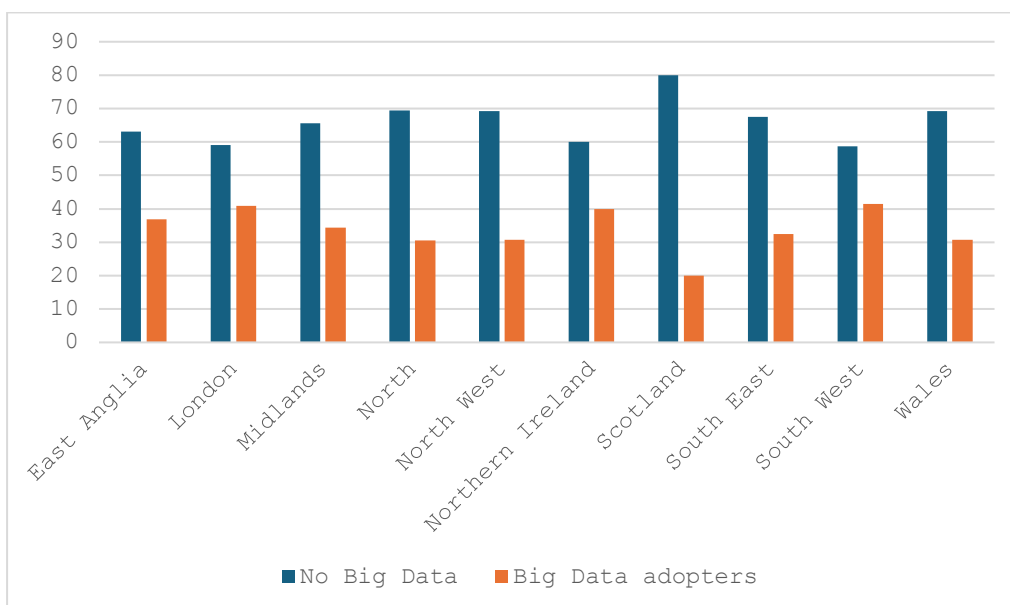
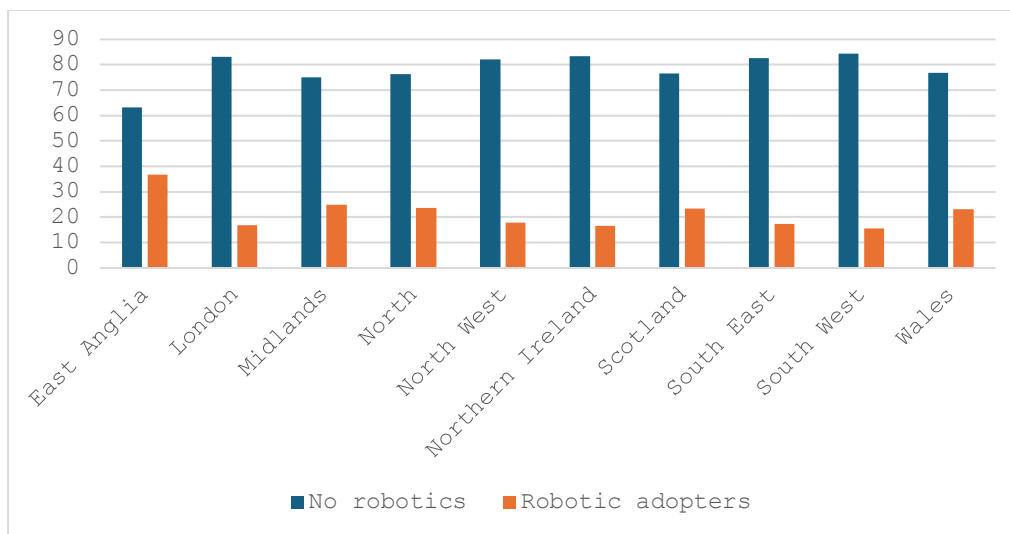


Figure 4: Robotics adoption by region (% of respondents)



Technological pioneers?

To what extent can we see technology adopters as being innovative firms that embrace all tech opportunities? Of those adopting AI, 52% also adopt Big Data use and we see that the correlation between the two is positive and significant. For AI and Robotics, the correlation is less pronounced, with only 24% of those engaging in AI also adopting Robotics. Interestingly, Big Data and Robotics are marginally more associated with each other than AI and Robotics. This raises an interesting question of whether Big Data is the connecting technology, despite AI being more pervasive.

Is optimism more pronounced among technology adopters?

We asked whether organisation felt that there would be growth in employment and/or turnover over the next 5 years. 71% of all respondents felt there would be a growth in sales, compared to 9% feeling that it would fall. Around 20% felt it would remain the same. Figure 5 presents the estimates of how much of a change respondents felt would occur over the 5-year period. The modal choice is between 6-25% growth or decline. While the ranking of the scale of growth or decline is quite similar, there is considerably greater polarity with the optimists – over 18% of whom feel sales could increase by 100%. At the other end of the spectrum, the more pessimistic respondents see reduction in sales as relatively modest, with very few forecasting large declines (exact percentages suppressed for categories with fewer than 10 observations).

Figure 5: Anticipated decline/growth in sales over the next 5 years (%)

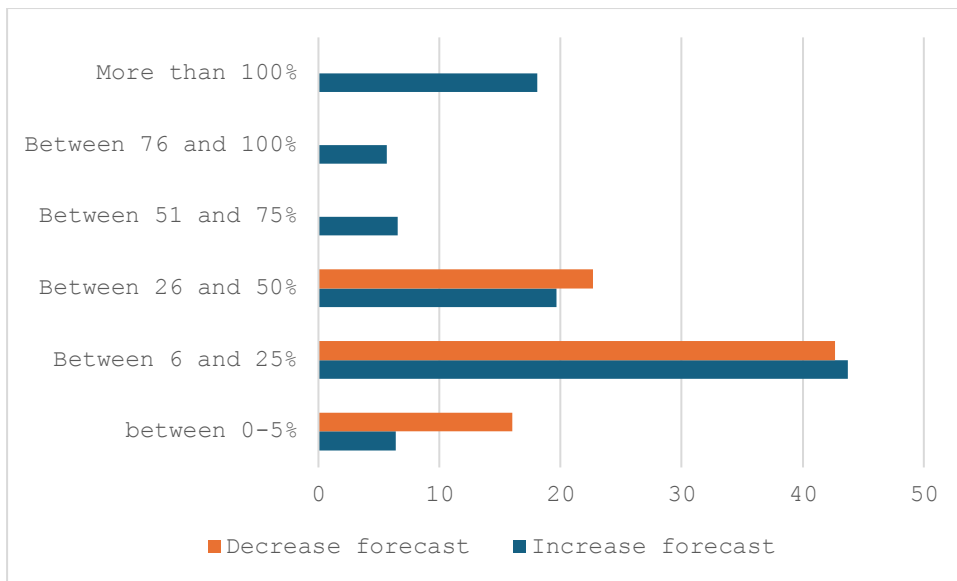


Table 2 provides a cut of the data that shows the adopters (and non-adopters) by their views about future sales. We see that there are significant differences in optimism between adopters and non-adopters across the different technologies. In terms of the test statistic, the smaller chi squared in relation to robotics is a function of the small sample size rather than a weaker relationship. Robotics adopters are more likely than Big Data and AI adopters to view the future as unchanged, whereas in the case of AI and Big Data, the adopters are considerably more optimistic about sales growth.

Table 2: Anticipated change in sales by technology adoption (%)

	No AI	AI Adopters	No Big Data	Big Data Adopters	No Robotics	Robotics Adopters
Decrease	15.9	6.96	12.7	5.51	11.57	*
Increase	59.8	77.26	64.2	83.47	68.47	*
Remain the same	24.2	15.78	23.09	11.02	19.96	81.34
Chi Squared Test:	24.57 ***		27.60***		9.72***	
N	239	431	433	236	536	134

Progressive labour practices and technology

We also ask about the extent to which organisations nurture engagement with their workforce; whether they have performance-related pay in place, or whether they include training for employees. Just over 52% of responding organisations have a salary bonus scheme system and around 56% of organisations provide training. Moreover, there is a clear positive association between the provision of training and performance related pay (chi squared=47.6).

In table 3, we explore the extent to which technology adopters are more or less likely to engage with performance-related pay. The chi-squared test shows the differences are significant, indicating that there is an association between the two. This appears to be more pronounced for robotics and big data adopters.

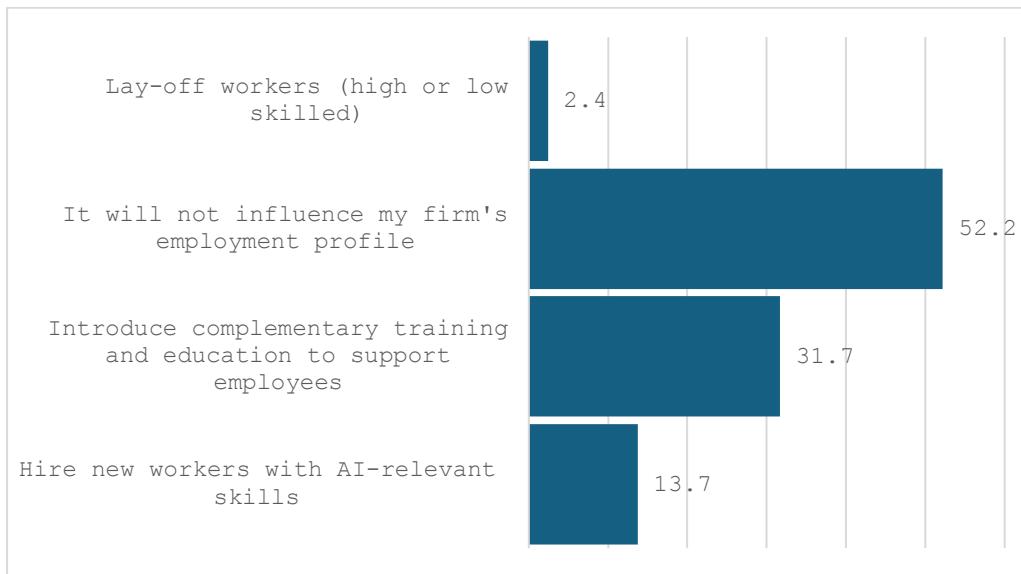
Table 3: Organisations with performance related pay by technology adoption (%)

	No AI	AI Adopters	No Big Data	Big Data Adopters	No Robotics	Robotics Adopters
No PRP	56.49	42.69	54.97	34.75	51.12	33.58
PRP	43.51	57.31	45.03	65.25	48.88	66.42
Chi-Squared Test	11.73***		25.03***		13.22***	
N	239	431	433	236	536	134

The role of skills

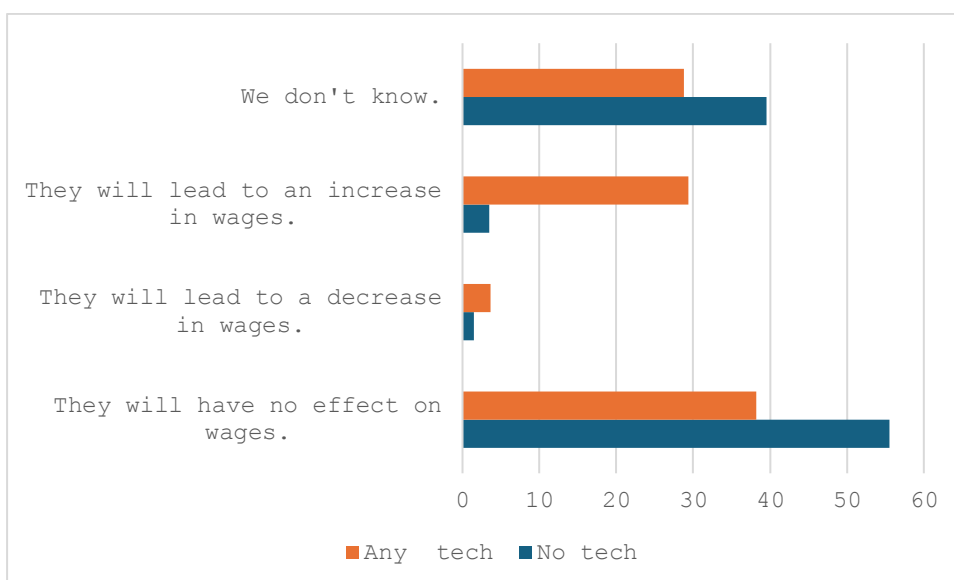
We asked respondents to let us know the likely implication of AI or robotics on shaping their workforce. Figure 6 presents the findings. We see that the dominant view of respondents is that it will have no influence (52%). Interestingly, the fear that technology will lead to the replacement of workers is less recognised as a driver for technology adoption. Rather, we see that where there is an anticipated response, firms are anticipating responding with training provision and adaptation of hiring requirements to ensure appropriate skills are recruited.

Figure 6: The anticipated effect of technology adoption on employment within the organisation.



When asked about the effect on wages, we see that around 43% felt technology adoption would not affect wages, while very few (3%) thought it would have a negative effect. A significant share of respondents (32%) felt that they could not say whether the effect would be positive or negative. If we look at those that engaged in any of the three technologies (Figure 7), we see that there are some differences. Those that report using Robotics, AI and/or Big Data appear to view it as having a positive effect on wages.

Figure 7: Anticipated effect of technology adoption on wages.



Summary of survey findings

Our initial analysis of the survey provides us with a number of stylised facts emerging from the data.

- 1. Almost 90% of businesses have engaged with some sort of change programme in the past 3 years**
 - a. Either a new production or distribution method (30%); new technology (72%); new product or service (70%) or a new type or form of business (44%)
- 2. While fewer respondents answered questions in relation to technology adoption (around 76%), of those that answered, most firms engaged in at least one form of new technologies**
 - a. Over 70% of respondents are engaged in some form of new technology (n=670)
 - b. The most dominant form of new technology is AI (64%)
 - c. The least adopted is Robotics (20%)
- 3. Firms that are not adopting technologies have lower levels of optimism about the future**
- 4. Organisations that adopt progressive labour practices such as PRP and training are more likely to be technology adopters**
- 5. Around half of firms provide paid-for training for their employees**
 - a. This is positively correlated with firms that engage with technology
- 6. 30% of businesses that engage with some form of technology anticipate it will lead to improvements in wages for workers.**

Next steps

Going forward, we will compare our findings with existing evidence in the literature with a special focus on the UK. We will also look at whether we can identify any associations between performance (as measured by labour productivity) and the adoption of these technologies. Finally, we have a subset of the data that have been matched to other data sources, with the permission of participants. This enables us to add other variables to our analysis. We are grateful to those respondents who have made this exploration possible.