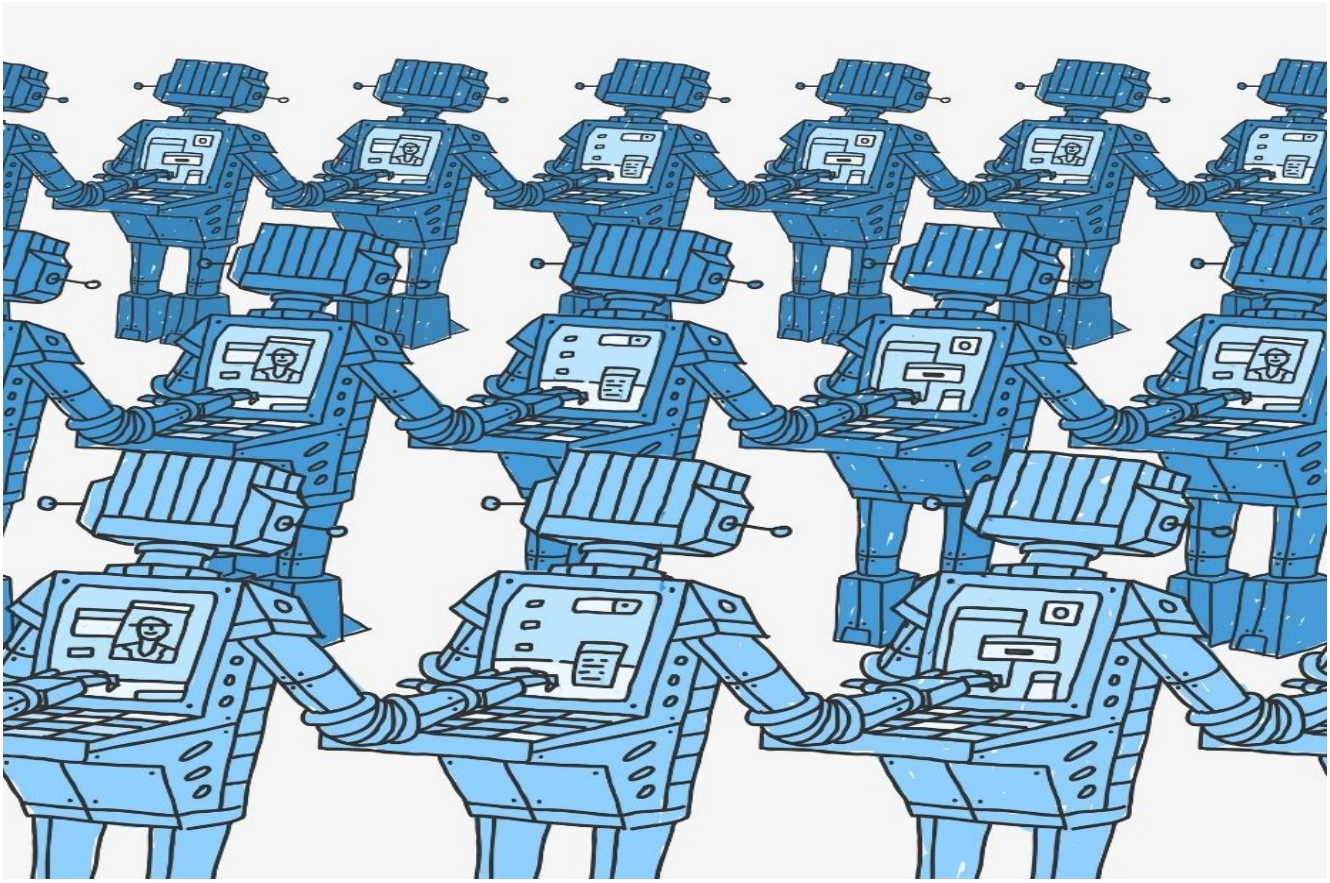

What Drives AI and Robot Adoption?

Findings from the Skills and Employment Survey 2024

Golo Henseke, Rhys Davies, Alan Felstead, Duncan Gallie, Francis Green, and Ying Zhou

HEADLINES

The rise of Artificial Intelligence (AI) and robotics in the workplace has sparked debates about their potential to reshape how we work, learn and interact. Against this backdrop, this report examines the evolution of work digitalisation since the 1990s, the drivers of AI and robot adoption in 2023/2024, and how technology adoption relates to workforce reductions. Key findings are:

- In 2024, digital technologies played a role in nearly all jobs, with 94% of workers using computers, computerised or automated equipment.
- 20% of workers used software incorporating AI, though use was concentrated in high-paying, high-skill roles.
- AI adoption was also more common among men, younger workers, and those with university-level education but remained relatively low in public services (15% versus 24% overall).
- Robots were used by 11% of workers, with adoption reaching 29% in manufacturing industries. Usage was relatively evenly distributed across the pay distribution, though men and ethnic minority workers were likelier to work with robots.
- The share of AI users surged from 15% to 24% between Q3 2023 and Q2 2024, indicating rapid adoption.
- Technology adoption over the last five years was not systematically linked to job cuts, breaking historical trends.

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1. Importance of Digitalisation

The rise of new Artificial Intelligence (AI) and Machine Learning (ML) technologies has ignited debates about their potential to reshape the labour market. Cautiously optimistic commentators highlight their promise to 'rebuild middle-class jobs' and enhance productivity by democratising predictive and decision-making tasks. More critical voices, however, warn of limited productivity gains and the risks posed by socially harmful applications, such as AI-powered coercion or manipulation. Against this backdrop, this report examines the evolution of work digitalisation since the 1990s, the drivers of AI and robot adoption by 2023/2024, and the evolving relationship between technology adoption and workforce reductions.

The economic impact of task-automating technologies depends on two key factors: the share of jobs exposed to them and how these technologies are deployed – whether to replace human labour (automation) or to augment workers' capabilities. Technologies with far-reaching transformative effects across a wide range of occupations are often termed general-purpose technologies. These have the potential to lead to significant productivity gains and economic growth and broadly disrupt how we work, learn, and interact. This category includes the steam engine, electricity, computers, and the internet. Some would add AI and robots to this list. Past waves of digital technologies have mainly helped augment workers in high-skill, high-intensity jobs. However, the extent to which AI and robotics follow this historical pattern remains an open question.

2. Previous Evidence

AI, typically powered by machine learning, excels at prediction and decision-making. Established digital infrastructure can lower upfront investment costs for users, facilitating AI adoption and integration into work. The public release of ChatGPT at the end of November 2022 put AI in the public spotlight and spurred rapid investment. For example, the global Google search index for the term 'AI' surged by 11 points in the three months following its release, and by February 2025, ChatGPT reported over 400 million users. ChatGPT and other generative AI are particularly effective in contexts involving text generation, writing, or conceptual reasoning, expanding AI's applications in knowledge-based work.

By comparison, robots operate primarily on (re)programmable logic to perform various motor tasks along multiple axes, such as welding, painting, assembly, or material handling in controlled environments. Their deployment typically requires significant upfront investment and infrastructure modifications, making adoption more capital-intensive and potentially slower than AI-enabled software solutions.

As of 2022, around 15% of all UK businesses had adopted at least one AI technology, with adoption reaching 68% in large companies. Across Europe, more than one in four workers reported that an AI tool or system was used in their workplace in 2024. The UK's robot density stood at about 112 per 10,000 workers in manufacturing in 2023 and has been relatively flat since the 2010s, trailing most other advanced economies. While these metrics highlight organisational adoption, detailed evidence of how AI and robotics are integrated into people's jobs has been scarce.

3. The Skills and Employment Survey 2024

The Skills and Employment Survey 2024 (SES2024) provides a comprehensive picture of AI and robot adoption across the British economy. The survey, conducted by NatCen under the direction of the research team, consists of a face-to-face survey of working adults aged 20-65 years old in Britain, an online survey of eligible respondents living in Britain, and an online survey of eligible workers living in Northern Ireland. The online surveys were conducted in the fourth quarter of 2023. This report combines the face-to-face and the British online panel components. Hence, the findings present a picture of Britain in late 2023 and the first half of 2024. The samples were drawn using random probability principles.

SES2024 is the eighth in a series of nationally representative sample surveys of workers aged 20-60 (since 2006, 20-65 years). The numbers of face-to-face respondents were 4,047 in 1986, 3,855 in 1992, 2,467 in 1997, 4,470 in 2001, 7,787 in 2006 (including Northern Ireland), 3,200 in 2012, 3,306 in 2017, and 2,824 in 2024. The online panel in the latest round contributed another 2,069 observations, resulting in a total sample of 4,893 workers in Britain in SES2024. The surveys cover trends in digitalisation, the use of task-automating technologies, and their implications for the workforce. Survey weights were computed for the complete series to correct for differential probabilities of sample selection and non-response.

4. Measures of Digital Technologies

The Skills and Employment Surveys have long-standing questions measuring the use of digital technologies at work. Since 1997, respondents have reported the importance of using a computer and other types of computerised equipment in their jobs, with responses ranging from 'essential' to 'not at all important'. A follow-up question measured the *complexity of computer use* ranging from 'straightforward' (printing out an invoice) to 'advanced' (using syntax, programming). Respondents were also asked to give their best estimate of the proportion of employees who work with computerised or automated equipment in their workplace. The surveys also provide trend data on the *introduction of new technology* at work (computerised or automated machinery and equipment, software applications or digital tools) and *workforce reduction* in the respondent's field of work in the five years before the interview.

SES2024 introduced several new questions to measure the adoption of advanced task-automating technologies. Respondents were asked: 'Does your job involve working with automated machinery, tools or processes, including the use of robots, AI algorithms and technologies for automated information sharing (such as Dropbox)?' Those who answered in the affirmative or indicated some importance of computer use in their job were asked to specify if their job involved 'the use of automated machinery, automated equipment or robots, these are machines which carry out complex physical

tasks' (Yes/No) or 'using software that has artificial intelligence' (Yes/No). We took the former as a measure of robot use and the latter of AI use.

Like with any measure, there are caveats. The questionnaire defined robots broadly, focusing on autonomous operation and the performance of physical tasks rather than re-programmability. As a result, the measure likely extends well beyond what experts would classify as industrial or service robots. There was no definition of artificial intelligence. Given the attention and high visibility, it is likely that many respondents associated it with consumer-facing generative AI such as ChatGPT or Claude AI. However, some may have interpreted the term AI more broadly. In general, low levels of non-response suggest that these questions were well-understood, a finding reinforced by an initial pilot survey, which did not identify issues with respondents' comprehension.

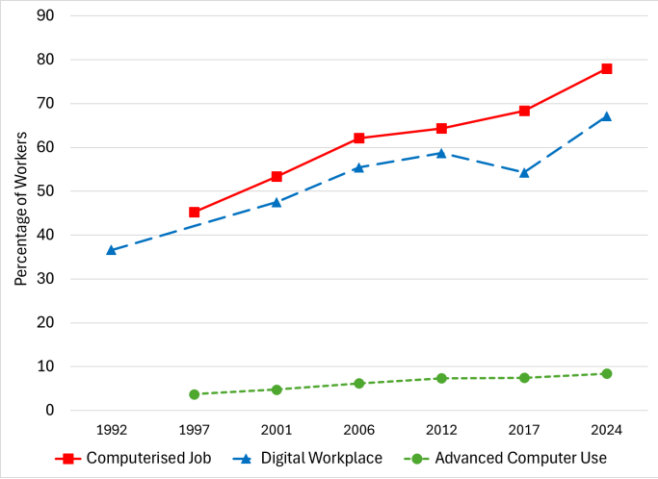
To examine differences in technology adoption, this report compares AI and robot use in survey data collected in 2023 and the summer of 2024 across individual characteristics, including age, sex at birth, ethnic minorities, educational attainment, and job attributes such as hourly pay, occupation, industry, sector, workplace size, high-performance working practices, and work intensity.

5. Findings

Digitalisation of Work

By 2024, the digitalisation of work was nearly universal, with 94% of the British workforce using computers or automated equipment in their job. 78% of workers considered computers 'essential' or 'very important' in their jobs, 33 percentage points up on the 1997 figure. The figure rose 17 points between 1997 and 2006, slowing to a 6 point increase between 2006 and 2017, before surging by another 10 points since 2017.

Figure 1: Long-Term Trends in Digitalisation



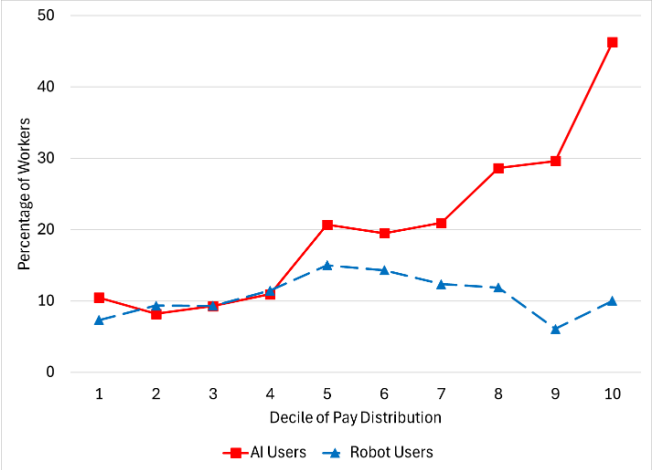
The share of workers in digital workplaces – defined as those where more than three-quarters of employees use computers – has increased steadily, reaching over two-thirds. Advanced computer use, including programming, roughly doubled from 4% in 1997 to 8% in 2024, though it remains relatively niche.

This niche is where the development and refinement of AI systems are likely to occur. However, for most workers, AI will be a tool to integrate with their job tasks rather than something they create – placing them among AI takers rather than AI makers. Universal digitalisation provides the foundation for rapid AI adoption. The scope of potential benefits and disruptions brought by advanced task-automating technologies will depend on how broadly these technologies can be deployed productively.

The Adoption of AI and Robots

In all, 32% of British workers used some task-automating technology, 21% used AI-powered software, and 11% reported working with robots. However, adoption varies. AI adoption is highest at the top end and lowest at the bottom end of the pay distribution, with nearly half of the workers using AI software in the top pay decile (Figure 2). In contrast, robot adoption is more evenly distributed across pay levels. A breakdown by occupation further highlights this pattern: noticeable AI use – defined as a user share above 1 in 10 – is present in 64% of 2-digit occupations, compared to around a third (36%) for robots. AI adoption is concentrated in high-skill occupations, while robots are used across all skill levels but within a narrower range of occupations. These patterns indicate that current AI solutions, like past digital technologies, primarily complement high-skill, high-pay jobs, whereas robotics is applied across skill levels but in fewer occupations.

Figure 2: AI and Robot Adoption Across the Pay Distribution

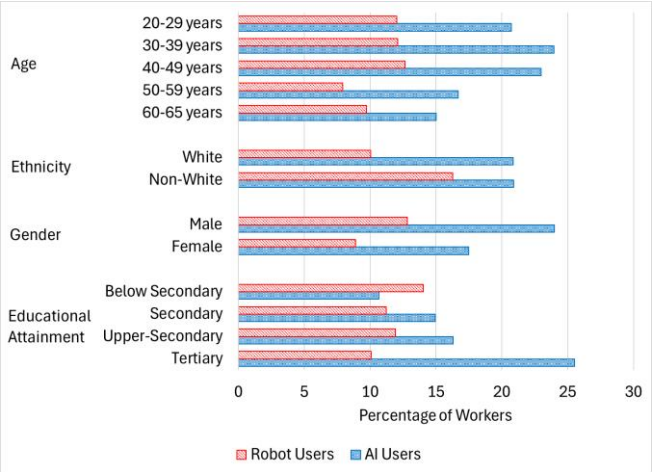


Worker-Level Difference in AI and Robot Adoption

Which workers are more likely to use AI or robots? Younger workers, men, and those with tertiary education are more likely to use AI, while robot use showed less variation across age and education. Women are less likely than men to use either technology, highlighting potential inequalities in access and utilisation (Figure 3). In more detail, tertiary graduates were about 10 percentage points more likely to use AI than secondary school leavers. Workers aged 30-39 were seven percentage points more likely to use AI than their 50-59 year old colleagues. Men were six percentage points more likely to use AI than women. In contrast, robot use was highest among workers with lower-level qualifications, but differences in the user share across education levels were generally minor. Similarly, by age, the robot user share stood at about 12% in the age groups under 50, declining to 8-10% among workers nearer retirement. Women were about four percentage points less likely to work with robots than their male

colleagues. Ethnic minority workers were six percentage points more likely than white workers to report robot use in their jobs.

Figure 3: Uptake of AI and Robots by Worker Characteristics



Overall, AI use varies with education, age, and gender, whereas robot use shows smaller variations by education and age but more pronounced differences by gender and ethnicity.

Workplace Antecedents of AI and Robot Adoption

Workplace adoption of new technologies is not just driven by technical feasibility but also by organisational considerations. Figure 4 shows that the prevalence of AI was higher in finance and business services than in other industries (32% versus 17% in the rest). In contrast, public services industries (health, education, and public administration) lagged behind, with an AI user rate of 15%. AI adoption was also associated with workplace size and the extent of workplace digitalisation. Furthermore, AI adoption was more prevalent in organisations with high-performance work practices such as management meetings where people can express their views, appraisal systems or quality circles. Rates of AI adoption were also higher in more intensive work environments – those where workers reported working at very high speed and to tight deadlines at least three-quarters of the time.

Robot usage was highest in production, reaching 29% in manufacturing industries and lowest in the Finance & Business and Public Services industries. As with AI, usage was higher in larger workplaces and contexts of more intensive work. By contrast, neither existing digital infrastructure nor high-performance work practices were associated with robot adoption.

In sum, the adoption of task-automating technologies differs systematically between organisations. Recent technological advances in AI and robots continue to be effort-biased and more widespread in larger organisations. AI use also varies with existing digital infrastructure and human resource management practices. Public Services were less likely to use AI or robots than other industries.

Change in AI and Robot Use in 2023/ 2024

There are clear signs of rapid AI adoption. Figure 5 shows that by mid-2024, 24% of workers used AI technologies – an increase of 9 percentage points since the third quarter of 2023 – likely reflecting the growing use of software such as ChatGPT. This pace mirrors trends in the United States, where 28% of workers reported using generative AI in August 2024. Robot adoption, by contrast, fluctuated at around 11%, with no significant changes over the same period. For context, the share of workers regularly using computers rose by about 2.5 percentage points per year during the late 1980s, when desktop computers were first widely adopted. The current diffusion of AI is unfolding at a significantly faster rate.

Figure 4: Differences in AI and Robot Uptake by Workplace Characteristics

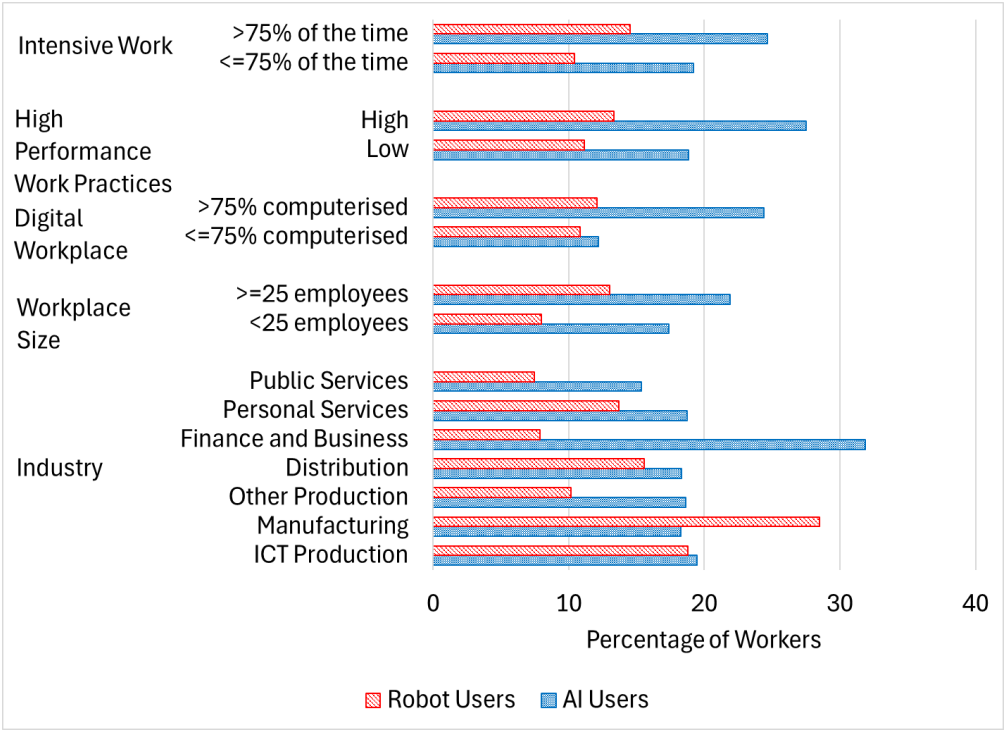
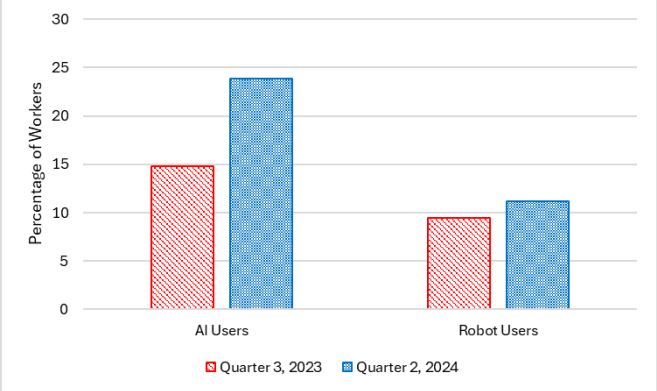


Figure 5: AI and Robot Share User Share in Q3/2023 and Q2/2024



Technology and Workforce Reductions

The picture so far has been one of rapid AI adoption across a large share of jobs with a concentration in the high-skill segment of the labour market and with differences by workplace characteristics. Conversely, robotics has a broader application across all skill levels, albeit in a narrower range of jobs. This section explores the relationship between introducing new technologies at work and the incidence of job cuts, shedding light on whether new technologies are deployed to replace people for machines. The interest is on how the relationship between new technologies and redundancies in SES2024 compares with the previous survey rounds since 2001.

Table 1 summarises trends in the percentage of workers reporting the introduction of new technologies and workforce reductions in their line of work over the five years before the survey interview. After stable levels of technology adoption (around 67%) in 2001 and 2006, the share of workers reporting an introduction of new technologies declined to 60% in 2017, the lowest point in the time series, before rebounding back up to 65% in 2024. Rates of workforce reduction rose sharply to 41% in 2012, likely reflecting post-recession economic pressures, before receding in subsequent years to their longer-term average (33% in 2017 and 29% in 2024).

Table 1: Trends in Technology Adoption and Workforce Reduction

	New Technologies (%)	Workforce Reduction (%)
2001	67.2	30.0
2006	66.8	30.3
2012	62.4	41.2
2017	59.7	32.8
2024	65.3	28.7

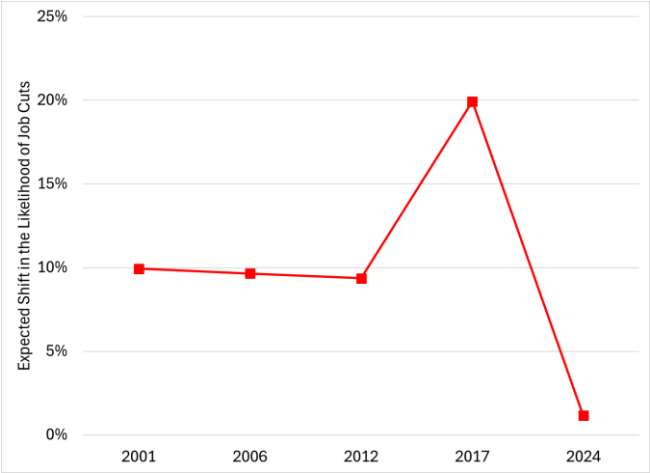
Note: The incidence of technology adoption and workforce reduction at the workplace was reported over the five years before the interview.

Next, we computed the *association* of technology adoption with workforce reductions. The association shows how closely the introduction of new technologies and redundancies were correlated and how this relationship has changed over the years. A figure above zero suggests that technology adoption and workforce reductions tended to go hand in hand, with larger values indicating a stronger relationship between new technologies and redundancies.

A striking finding from SES2024 is the decoupling of technology adoption from workforce reductions, breaking historical trends. Historically, introducing new technologies was associated with job cuts, as businesses might have sought to reduce costs and enhance efficiency. This trend peaked in 2017 when workers in organisations adopting new technologies were nearly 20% more likely to report job cuts. By 2024, this relationship had virtually disappeared. These findings suggest that technology adoption does not inherently lead to job cuts but is shaped by broader economic and labour market conditions. The past five years – marked by Brexit, Covid-19, shifting locations of work, skills shortages, and high inflation – may have altered how organisations deploy technology, with a greater emphasis on augmenting human work rather than automating jobs outright.

However, this pattern may not hold in the long run. As organisations refine their AI strategies and identify ways to drive efficiency and reduce costs, the balance between augmentation and automation will shift, potentially leading to renewed pressures on jobs.

Figure 6: The Relationship between Technology Adoption and Workforce Reductions over Time



Note: Introduction of new computerised/automated equipment or communication technology. Workforce composition held constant by age, sex at birth, ethnicity and work experience.

6. Policy Implications

The mid-2020s mark a pivotal moment in the adoption and deployment of Artificial Intelligence (AI) and robotics. The UK Prime Minister, Sir Keir Starmer, has described AI as a 'force for change' and an opportunity to 'turbocharge growth', underscoring its role in economic policy discussions. As this report highlights, AI adoption is accelerating, with a quarter of workers using AI-powered software in their jobs in the spring of 2024. However, this adoption is concentrated in high-skill occupations, while adoption rates in specific industries such as public services remain relatively low.

Reviewing AI Adoption Across Industries

Without a concerted effort to boost AI adoption in lagging industries, AI's potential efficiency and productivity gains will not be fully harnessed. However, public services present unique challenges for automation, given their role in delivering fair, accountable, and people-centred services. Ensuring transparency and fairness in AI adoption will be key to maintaining public trust. Possible

policy initiatives to address the uneven utilisation across industries include establishing an AI deployment fund that provides targeted incentives for public sector organisations to trial and integrate ethical, high-quality AI solutions, alongside the development of sector-specific roadmaps that identify barriers and support responsible AI adoption in underutilised areas.

Enhancing Labour Market Intelligence
The rapid growth of AI adoption underscores the need for better labour market intelligence to assess its impacts on job displacement, skills demand, and transformation of work. Additionally, while the recent bout of technological change was not associated with job cuts, future impacts on job security remain uncertain, particularly as AI tools become more sophisticated. Ongoing monitoring is crucial to anticipate employment disruptions and ensure AI augments rather than replaces human labour. We recommend establishing an AI Labour Market Observatory to track AI's impact on employment and job quality, getting national employment and earnings data back on track, including by adding questions on AI and technology use, and conducting a regular AI Skills Audit to identify emerging skills gaps and mismatches.

Ensuring Equitable AI Benefits Across the Workforce
To ensure an equitable transformation, the UK government should promote worker involvement in AI deployment decisions, ensuring employees have a say in how AI is integrated into their work. It should seek to encourage participatory AI governance models, where workers and management collaboratively shape AI adoption strategies. Moreover, expanding AI literacy training programmes and providing retraining pathways for workers in at-risk jobs to facilitate reskilling can help foster broader workforce preparedness.

Conclusion
The UK's AI adoption is progressing, but challenges continue to emerge in ensuring benefits across all industries and skill levels. While AI's trajectory suggests transformative potential, its long-term impact remains uncertain and uneven, with some workers and industries positioned to benefit while others face disruption. Policymakers must balance support for adoption with measures to mitigate unintended consequences. By focusing on adoption incentives, labour market intelligence, and workforce skills, decision-makers in policy, business and trade unions can strive to maximise AI's potential while acknowledging the trade-offs involved and addressing the concerns of those who may be disadvantaged.

Further Reading

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All titles are downloadable free from the survey website: wiserd.ac.uk/project/ses/ses2024. The NatCen SES2024 Technical Report which outlines in detail how the data were collected along with the questionnaires used is also available. You may also like to take the www.howgoodismyjob.com quiz which is based on some of the questions used in the survey.

Author Affiliations: Golo Henseke – UCL; Rhys Davies – Cardiff University; Alan Felstead – Cardiff University Duncan Gallie – Nuffield College, Oxford; Francis Green – UCL; and Ying Zhou – Surrey University.

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