GERMANY

COUNTRY REPORT

Unlocking Germany's AI Ambitions in the Digital Decade

Germany illustrates the accelerating potential of the European Commission's Digital Decade. German businesses are increasing their digital investment and increasingly looking to adopt more advanced digital technologies, including artificial intelligence (AI) and cloud computing.

AWS shares this vision and commissioned independent research consultancy, Strand Partners, to undertake research to examine where Germany finds itself on the journey to the Digital Decade targets.

This research, the first of its kind since the boom in the adoption of generative AI and large language models (LLMs) in 2023, uncovers significant acceleration in the uptake of AI in 2023, but also notes that there are several barriers Germany has to overcome in order to meet the Digital Decade goals to have 75% of businesses using cloud, big data, and AI by 2030. A key challenge here is to overcome the digital skills gap, with businesses struggling to find staff with the required digital skills to meet their bold digital aspirations. With the European Commission aiming for 80% of the population to have basic digital skill levels by 2030[1], this study, which builds on a 2022 report carried out by Public First and commissioned by AWS, notes that German businesses and government will need to work to further upskill employees and citizens to meet this key target.

Key Statistics (Methodology here)

- **36%** of German businesses reported adopting AI in 2023, up from 28% in 2022; a percentage increase of **29%**.
- The increased adoption of digital technologies, most notably AI, could unlock **€668 billion** for Germany's economy by 2030, €116 billion more than 2022's prediction of €552 billion.
- Businesses using AI report a range of benefits: **92%** recorded increased efficiency and **72%** more streamlined operations.
- **54%** of German businesses are very familiar with cloud technology, significantly more than the European average (39%). This is even higher for larger businesses (70%) but falls below half (48%) for micro-businesses (those employing under 10 people).
- **64%** of German businesses specifically train non-tech employees to handle new technologies, and 45% of German businesses train their tech employees to use new technologies on a regular basis.
- **70%** of German businesses think that German companies do not invest enough into tech infrastructure and development, while **72%** think that public sector organisations do not invest enough.

Harnessing the Power of Digital

German businesses, in line with their counterparts in other European countries, are increasingly reliant on digital technology in their everyday operations. Access to reliable technology is a prerequisite for building a resilient business in Germany; **76% of businesses** in Germany say they would struggle to operate effectively if their digital technology failed. The importance of digital is also exemplified by the fact that **88% of businesses** cite digital technology as crucial for reaching their five-year growth goals. This is even higher for small businesses (those employing less than 50 people), where 90% agree that digital technologies are crucial for achieving their growth goals. It is therefore unsurprising that German businesses are increasing their investment in digital technology. In the past twelve months, German businesses' spending in this area has **increased by 52%**, with a similar jump in spending planned for the next year (53%).

76% noted that they would **struggle to operate effectively** if their digital technology failed

88% cited digital technology as **crucial for reaching their five-year growth goals**

In the past twelve months, **spending in this area has increased by** **52%**

Cloud & AI: The Twin Pillars of Digital Transformation

German businesses are among the leading embracers in Europe of emerging digital technologies. They are taking a holistic approach to digital modernisation, recognising the importance of the cloud technology that underpins AI.

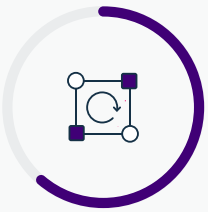
Over half (54%) of German businesses are very familiar with cloud technology and what it does, significantly more than the European average (39%), and **93%** of German businesses have heard of cloud computing, more than the European average (93%). Cloud computing tools have enabled German businesses to digitise and streamline their work; **47%** report that adopting cloud computing enabled the replacement of paper or manual processes, compared to 39% across Europe.

Building on their strong understanding of the benefits of cloud computing, German businesses enthusiastically recognise the transformative power of AI. **36%** of German businesses reported having adopted AI 2023, a percentage increase of **29%**, up from 28% having adopted AI in 2022.

AI adoption has yielded tangible benefits for businesses:

92%
reported **enhanced efficiencies**

72%
have experienced **streamlined operations**



This uptake of AI seems likely to continue, with
61%
forecast that AI will **significantly transform their industry** over the next five years

If this increased adoption is maintained, it could unlock **€668 billion** for Germany's economy, €116 billion more than 2022's prediction of €552 billion.[2]

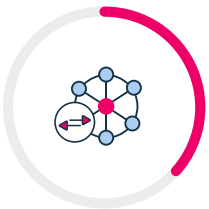
AI adoption is strongest among financial service (**55%**), information and communication (**54%**) and transport and logistics (**49%**). Adoption was weakest among the arts (**10%**), education (**13%**) and construction (**18%**) industries.

Legal and Regulatory Uncertainties

German businesses serve as leaders in Europe's digital transformation, but recognise that there is a long way to go in this journey.

Only 32% of German businesses feel that German companies are already exploiting the full potential of cloud computing and **25%** that German companies are already utilising the full potential of AI and machine learning in order to achieve their goals.

However, barriers remain which threaten to prevent Germany from maintaining its increased adoption of AI. Greater flexibility in choice of AI provider and increased ability to switch between providers would help a significant number of German businesses to increase their adoption of AI technologies. **37%** of businesses cite a lack of ability to switch AI providers as a barrier, and **25%** point to the strict standards of exchange of data between AI providers as barriers to adoption. Lack of flexibility in these areas is thereby preventing businesses from making the most of the technology available. For Germany to reach its digital potential, it will therefore be important to address legal and regulatory uncertainties regarding the use of AI technologies. A stable marketplace, supported by a principle-based and open regulatory framework, provides the best basis for increasing technological experimentation and adoption.



37%
cite a lack of ability to switch AI providers

25%
cite the strict standards of exchange of data between AI providers as barriers to adoption

In December 2023, the EU reached a provisional agreement on the AI Act, forming a broad legal framework for regulating the use of AI. AWS supports government efforts to put in place effective risk-based regulation for AI that protects people and their rights and encourages trust, while also allowing for continued innovation and practical application.

AWS encourages policymakers to continue pursuing an innovation-friendly and internationally coordinated approach. It is committed to collaborating with the EU and industry to support the safe, secure, and responsible development of AI technology.

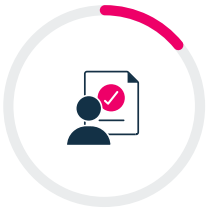
German businesses also believe that greater digital investment is needed to enable Germany to progress towards its digital goals. **72%** of German businesses think that German public sector organisations do not invest enough into tech infrastructure and development, and **70%** similarly think that German companies do not invest enough into these areas. Governments and local authorities must provide better financial support for businesses to better prepare for the future of the digital economy.

The Digital Skills Conundrum: Aspirations vs. Reality

Although German businesses indicate a strong desire to explore and access the benefits of AI, their digital skill capabilities lag behind, creating a deficit that could prevent the country from reaching its full digital potential.

A lack of internal digital skills was reported by German businesses as a key barrier preventing adoption of AI technologies. Despite recognising the importance of cloud and AI technologies, a very low proportion (**15%**) of German businesses find it easy to hire individuals with the necessary digital skills - even less than the European average (19%). This lack was especially prominent in manufacturing (only **10%** find it easy to hire) and construction (only **11%** find it easy) industries. This figure is even lower for small German businesses (those employing less than 50 people), where just **12%** find it easy to hire those with the necessary digital skills. German businesses not only lack advanced digital skills needed to run AI technologies, but **57%** also report lacking the most basic digital skills, such as sending emails and editing documents, more than any other surveyed European country.

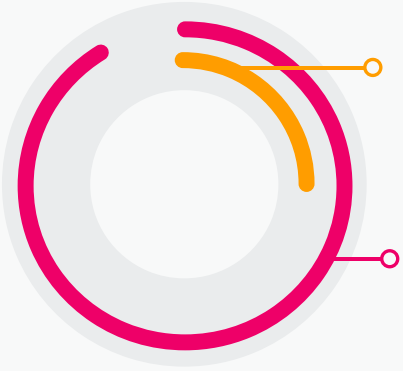
The Digital Decade aims to ensure that, by 2030, 80% of all workers have basic digital skills, and German businesses are responding to this shortfall in a variety of ways. The most common response to address the shortage of skilled workers in technical fields is upskilling or retraining (**42%**), followed by emphasis on this in traditional recruiting efforts (**32%**), and turning to technological solutions, such as AI technology or automation (**25%**). Just over one fifth (**21%**) of German businesses say that they are turning to recruitment abroad in order to address digital skills shortages in Germany.



15% of German businesses find it easy to hire individuals with the necessary digital skills

57% report lacking the most basic digital skills, such as sending emails and editing documents

The most common response to address the shortage of skilled workers in technical fields is upskilling or retraining (**42%**)



25%
Businesses confident to train existing staff

92%
Channelling resources into upskilling

German businesses are therefore primarily striving to close this skills gap through training. Though only 25% of German businesses currently feel confident that they can train their existing staff with digital skills, the vast majority (92%) are channelling resources into some form of digital skills training.

German businesses are seeking to improve digital skills even among non-tech employees, as **64%** specifically train non-tech employees to handle new technologies, while **45%** also report that they train their tech employees in new technologies on a regular basis. However, only a small percentage of companies (**11%**) participate in upskilling programs for untrained workers or the unemployed. By increasing investment in digital skills across the current and potential workforce, Germany can raise its digital ambitions.

Citizens' Viewpoint: Anticipation and Caution

While German citizens recognise the likely impact of AI on their lives and society, they have more tempered expectations than many of their European peers. **Only 43% of Germans** believe that AI will pose a significant impact in the next three years, compared to the European average of 51%.

Nonetheless, German citizens recognise the transformative potential of AI across society in the long-term. **70%** of German citizens report that they are familiar with AI, although only **21%** say that they understand what it means. **65%** think that education is likely to be transformed by AI, and **63%** that the healthcare sector could be transformed. These findings are supported by World Economic Forum research, which finds these areas as among the most likely to be both radically disrupted by AI and also the biggest sectors of growth.[3]

Additionally, **56% of Germans** view AI as a potent tool against leading societal issues such as climate change, above the European average (52%).

Despite optimism about the positive potential of AI, **two-thirds (66%) of Germans** have some apprehensions about its development. Those who are concerned most frequently cite a fear of job losses due to AI (**48%**).

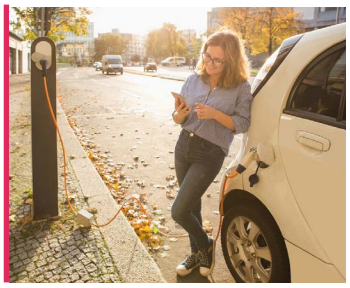
Emerging research suggests that these fears are overstated. A World Economic Forum (WEF) report estimates that AI will have a 25.6% net positive impact on job growth until 2028.[3] The WEF 2024 white paper on the Rise of Global Digital Jobs similarly noted that by 2030, the number of global digital jobs is expected to rise to around 92 million - these are generally higher paid roles.

The World in Numbers: Jobs session at Davos 2024 noted that AI would support employees in their jobs, by augmenting tasks. For example, it could help call-centre workers to become more productive and have greater job satisfaction.

It is recognised that AI will significantly change the workplace but that technology adoption will be a driver of growth rather than unemployment. The key to unlocking a smooth transition within the workforce is ensuring that all are equipped with the right digital skills to be a part of the digital economy.

CASE STUDY:

TWAICE



Bringing an Emissions-Free Future Closer to Reality

TWAICE is a German company providing predictive analytics in order to help electric vehicle (EV) makers and renewable energy firms optimise their use of battery technology. The company uses data analytics and artificial intelligence to provide insights for its customers.

Core features:

- **Cloud Native:** TWAICE has developed a cloud-native platform with AWS, helping it to process data more quickly and provide better solutions.
- **Managing Growth:** as TWAICE grew, it needed digital technology to match this growth. It is now able to scale computing capacity in the cloud to match demand, cutting costs and producing faster results.
- **Data Analytics:** the analytics TWAICE provides requires the processing of a large amount of data – and the company has grown from 10,000 items to several billion every day.

Key advantages:

- **Cost Reduction:** TWAICE enables customers to achieve significant cost reductions of up to 50% during the development of batteries and to increase the battery lifecycle by over 20% as well as reducing transaction costs and operational friction along the way.
- **Boosting Efficiency:** digital technology has helped TWAICE to increase its IT efficiency, significantly improving its development and innovation. Development time has been reduced from months to weeks, and deployment times have been reduced to just a few hours.
- **Weeks to Hours:** TWAICE was receiving an increasing amount of customer requests, while its old system often required up to two weeks to onboard them. By automating this process, TWAICE was able to cut this process to hours – and increase its customer count by almost 100%.

Raised ambitions:

- **Speeding innovation:** By automating key processes and increasing IT efficiency, TWAICE was able to focus on its core business. Its development team is able to focus on future innovation, instead of customer onboarding.

Digital technology and cloud computing has helped TWAICE to streamline its IT complexity, allowing it to focus on speeding onboarding and development. TWAICE is helping its customers to get the most out of their battery technology, and is looking to grow further to match rising consumer interest in reducing emissions.

Conclusion

German businesses are among the leaders in Europe in embracing emerging digital technologies like AI, recognising their transformative potential and the economic opportunities AI provides. Citizens are also optimistic about AI's potential to impact society in a positive way, albeit with some concerns about its impact on the jobs market.

This study shows that there is clear potential for Germany to meet the Digital Decade goals for AI adoption by 2030, if increased rates of adoption are maintained.

In order to harness this momentum and achieve Germany's digital potential, overcoming the digital skills gap remains the clear key challenge. German businesses are acutely aware of this, as demonstrated by their considerable efforts towards upskilling and retraining initiatives. This study outlines a number of recommendations for overcoming these barriers to economic growth through digital transformation and giving businesses potential to unlock the benefits promised by AI.

References:

1. The European Parliament defines AI as the 'ability of a machine to display human-like capabilities such as reasoning, learning, planning and creativity. AI enables technical systems to perceive their environment, deal with what they perceive, solve problems and act to achieve a specific goal.' AI tools and softwares include: virtual assistants, image analysis software, search engines, personalised online shopping recommendations, and machine translations. They may also include GenAI tools, which can produce new content, such as ChatGPT or Google Bard.

2. Our headline estimate of the potential impact of digital transformation is an update on the economic modelling published in 2022, with new data from 2023. This model is based on the potential economic impact of achieving the following four goals, based on the European Commission's Digital Decade targets:
   - Increasing businesses' cloud computing uptake to 75%.
   - Small business adoption of three key digital tools and services (CRM, ERP, and fast broadband) increases to 90%.
   - 80% of German adults achieve basic digital skills.
   - Taking maximum advantage of the potential economic impact of AI and big data.

3. The World Economic Forum, 'Future of Jobs Report 2023', May 2023.