I6EAL RESEARCH NOTES IN AI ECONOMICS AND DIGITAL POLICY

Firm Size and Sector Gaps in Enterprise AI Adoption: Germany and the EU-27 in 2025

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25.97%	19.95%	+6.02 pp	8 / 27
Germany	EU-27	difference	member-state rank

ABSTRACT

This research note uses harmonised Eurostat ICT-usage statistics to describe enterprise artificial-intelligence adoption in Germany relative to the EU-27 in 2025. The population covers enterprises with at least ten employees and self-employed persons in covered non-financial NACE activities. AI use is reported by 25.97% of German enterprises, compared with 19.95% in the EU-27, placing Germany eighth among member states. Adoption rises sharply with firm size in Germany, from 23.06% among enterprises with 10–49 employees to 56.99% among enterprises with 250 or more. Germany exceeds the EU-27 aggregate in each of eight displayed activity groups, with the largest difference in information and communication (75.38% versus 62.52%). The comparisons are descriptive, not causal. Survey flags, missing values and denominators are retained, and a reported German enterprise-definition break in 2025 limits longitudinal interpretation.

JEL O33, L25, M15
KEYWORDS artificial intelligence · technology adoption · firm size · sector heterogeneity · Germany · European Union · digitalisation

1. Research question and contribution

Enterprise adoption is one of the observable margins through which artificial intelligence may enter production, organisation and service delivery. An aggregate national rate, however, can conceal substantial differences between small and large firms and between economic activities. Those differences matter for the interpretation of digitalisation indicators: a country can record an above-average total while adoption remains concentrated in particular parts of its business population.

This note asks a deliberately narrow descriptive question: where does Germany stand relative to the EU-27 aggregate in 2025, and how does the published difference vary across three employment-size classes and eight economic-activity groups? It answers that question with harmonised Eurostat statistics from the annual survey on ICT usage and e-commerce in enterprises. The contribution is a compact, reproducible cross-section that preserves the source denominator, survey flags and category boundaries rather than combining them into a synthetic adoption score.

The findings are descriptive. They do not identify a policy effect, a productivity effect or a causal German advantage. Firm size, industry composition, survey design, reporting behaviour and many unobserved factors may jointly shape the published rates. The note therefore reports percentage-point differences and rankings without significance tests or causal language.

Headline result

In 2025, 25.97% of German enterprises in the covered population reported using at least one of the listed AI technologies, compared with 19.95% in the EU-27 aggregate: a difference of 6.02 percentage points. Germany ranks eighth among the 27 member states on the published value.

2. Data and definitions

The analysis uses Eurostat datasets isoc_eb_ai and isoc_eb_ain2. They originate in the annual EU survey on ICT usage and e-commerce in enterprises, which is collected by national statistical institutes using harmonised model questionnaires. Eurostat reports that the 2025 survey covered a target population of roughly 1.53 million EU enterprises with at least ten employees and self-employed persons, from which about 157,000 enterprises were surveyed.

The statistical population used here consists of enterprises with at least ten employees and self-employed persons in the covered non-financial NACE Rev. 2 activities: sections C to J, L to N and group 95.1, with the financial sector excluded. Micro-enterprises below the ten-person threshold are outside this population. The unit PC_ENT is the percentage of enterprises in the applicable population, not the percentage of workers, turnover or output.

The overall indicator E_AI_TANY denotes enterprises using at least one of the AI technologies published for the 2025 questionnaire. The eight technology categories overlap at enterprise level, so they cannot be added. The sector table uses the same overall indicator and denominator within each activity group. The EU-27 figure is Eurostat's published aggregate, not an unweighted mean of member-state percentages.

- Reference year: 2025; Eurostat data state used by the frozen analysis: 15 June 2026.
- Geographies: Germany, the published EU-27 aggregate and all 27 member states for the rank.
- Size classes: 10–49, 50–249 and 250 or more employees and self-employed persons.
- Activity groups: manufacturing; construction; wholesale and retail; transportation and storage; accommodation and food service; information and communication; real estate plus professional, scientific and technical activities; and administrative and support services.

— Missing and flagged cells remain distinct. No missing value is replaced with zero.

Comparability boundary

Destatis notes use of the EU enterprise concept for Germany from reporting year 2025. Eurostat also added the category for generating pictures, video or sound to the 2025 AI-technology set. For that reason, this note treats 2025 as a cross-section and does not interpret the 2021–2025 path as a clean growth series.

3. Method

The calculation is intentionally transparent. For each comparison, the corresponding published EU-27 percentage is subtracted from the reported German percentage to obtain a difference in percentage points. Member states are sorted by the 2025 overall value in descending order; ties would receive their position in that ordered list. The Netherlands carries Eurostat's break-in-series flag in the frozen source and remains visibly flagged in the analysis table. Germany's value is unflagged.

No reweighting, interpolation or model-based adjustment is applied. The source percentages already embody the official survey weighting and estimation procedures. The extracted table does not supply standard errors for these cells, so the analysis makes no claims about statistical significance. Ratios are used only as descriptive scale comparisons and not as effect estimates.

A frozen, machine-readable analysis table accompanies the paper. Its source fingerprint records the exact 2,352-observation i6eal projection used for the release. The live AI Adoption Atlas may later incorporate Eurostat revisions, but the paper, analysis CSV and reported results remain version-stable.

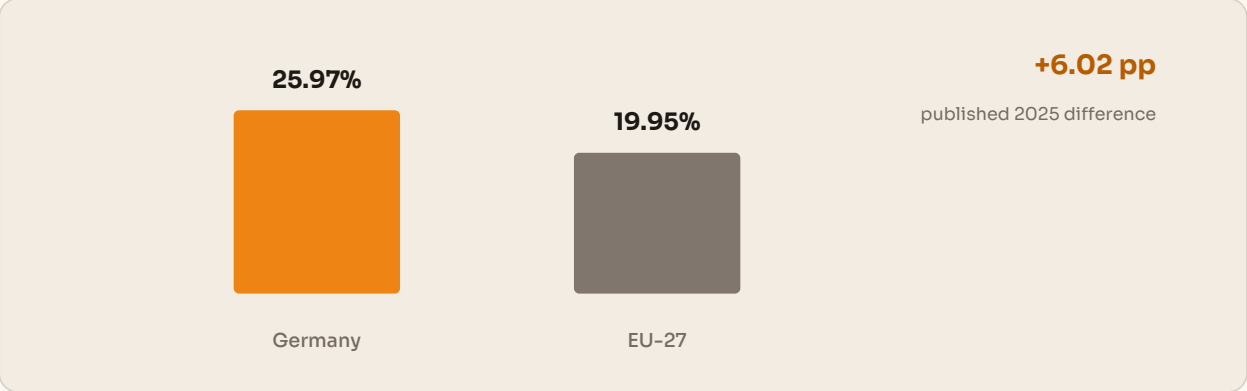

Figure 1. Germany and the published EU-27 aggregate, enterprises using at least one listed AI technology, 2025 (% of enterprises). Source: Eurostat isoc_eb_ai / isoc_eb_ain2; frozen i6eal analysis table.

4. Results

4.1 Aggregate position

Germany's 2025 enterprise AI-use rate is 25.97%, 6.02 percentage points above the EU-27 aggregate of 19.95%. Seven member states have a higher published rate, placing Germany eighth of 27. The top three are Denmark (42.03%), Finland (37.82%) and Sweden (35.04%). The ranking is a descriptive ordering, not a quality or performance score.

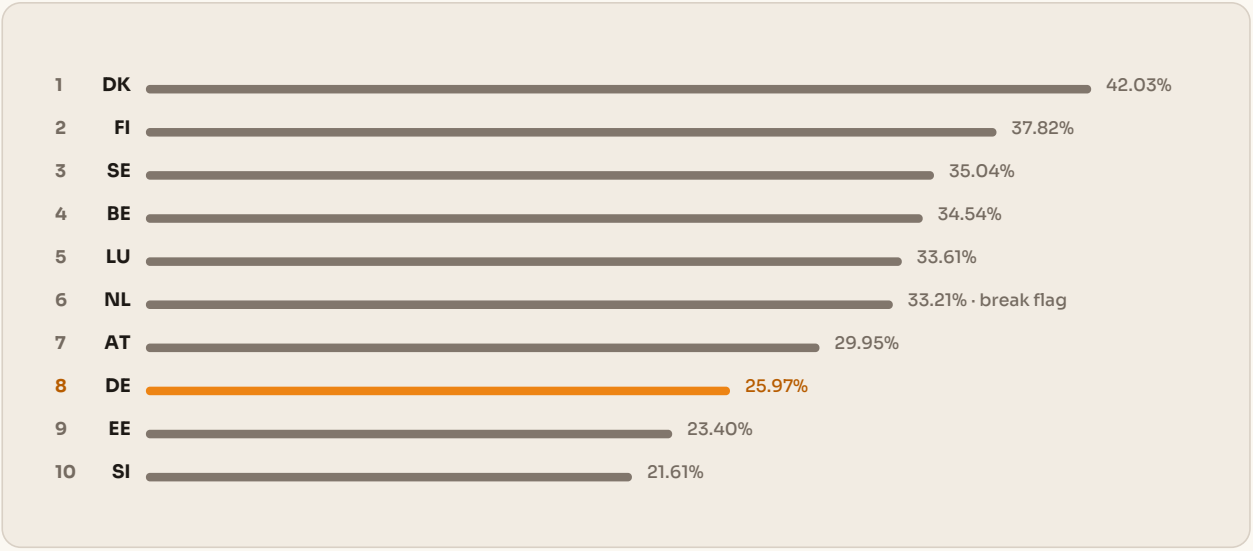

Figure 2. Ten highest published member-state values in 2025. The Netherlands carries Eurostat's break-in-series flag; Germany is highlighted.
Source: Eurostat isoc_eb_ai / isoc_eb_ain2; frozen i6eal analysis table.

4.2 Firm-size gradient

Reported AI use rises with firm size in both geographies. In Germany, the rate is 23.06% among enterprises with 10–49 employees and self-employed persons, 35.56% in the 50–249 class and 56.99% among enterprises with 250 or more. The corresponding EU-27 rates are 17.00%, 30.36% and 55.03%.

The German–EU difference narrows across the three size classes: 6.06 percentage points among small enterprises, 5.20 among medium-sized enterprises and 1.96 among large enterprises. Within Germany, the published large-enterprise rate is 33.93 percentage points above the small-enterprise rate and about 2.47 times as high. These gaps are conditional descriptions of size classes, not estimates of a size effect.

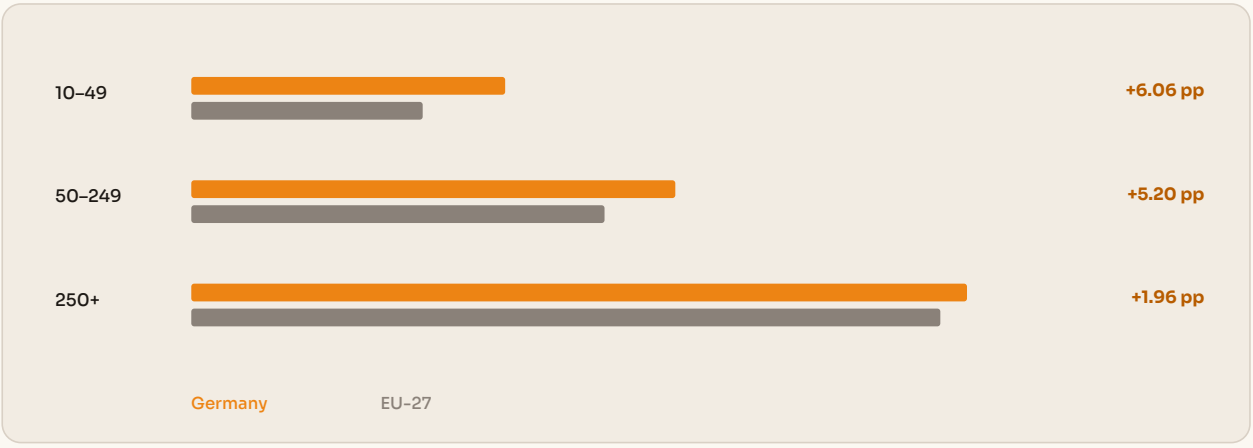

Figure 3. Enterprise AI use by employment-size class, Germany and EU-27, 2025. The right-hand labels show Germany minus EU-27 in percentage points.
Source: Eurostat isoc_eb_ai / isoc_eb_ain2; frozen i6eal analysis table.

Employment-size class	Germany	EU-27	Difference
10–49 employees and self-employed persons	23.06%	17.00%	+6.06 pp
50–249 employees and self-employed persons	35.56%	30.36%	+5.20 pp
250 or more employees and self-employed persons	56.99%	55.03%	+1.96 pp

Table 1. Published percentages and Germany–EU-27 differences, 2025.
Values are percentages of enterprises in the applicable population; pp = percentage points.

4.3 Sector heterogeneity

Germany exceeds the published EU-27 aggregate in each of the eight displayed activity groups, but the differences range from 1.07 to 12.86 percentage points. The largest observed difference is in information and communication: 75.38% in Germany versus 62.52% in the EU-27. The next-largest differences appear in the combined real-estate, professional, scientific and technical group (7.44 points), manufacturing (7.11) and wholesale and retail trade (6.84).

The smallest differences are in transportation and storage (1.07 points), administrative and support services (2.22), and accommodation and food service (2.65). The sector results show why the total should not be read as a uniform national lead: the same aggregate difference can coexist with near-parity in some activities and double-digit separation in another.

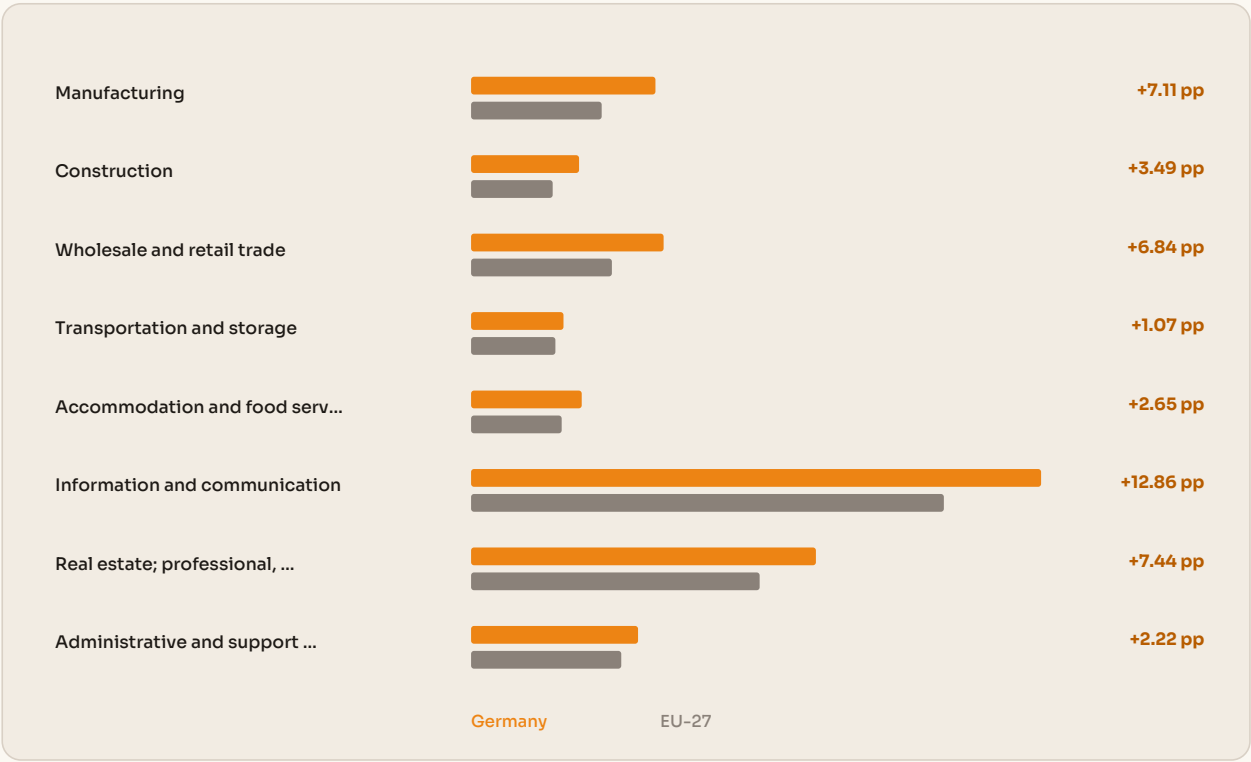

Figure 4. Enterprise AI use by economic activity, Germany and EU-27, 2025. Categories preserve Eurostat's published NACE grouping.
Source: Eurostat isoc_eb_ai / isoc_eb_ain2; frozen i6eal analysis table.

Economic activity	Germany	EU-27	Difference
Manufacturing	24.38%	17.27%	+7.11 pp
Construction	14.28%	10.79%	+3.49 pp
Wholesale and retail trade	25.46%	18.62%	+6.84 pp
Transportation and storage	12.22%	11.15%	+1.07 pp
Accommodation and food service	14.63%	11.98%	+2.65 pp
Information and communication	75.38%	62.52%	+12.86 pp
Real estate; professional, scientific and technical activities	45.60%	38.16%	+7.44 pp
Administrative and support service activities	22.08%	19.86%	+2.22 pp

Table 2. Published percentages and Germany–EU-27 differences, 2025.
Values are percentages of enterprises in the applicable population; pp = percentage points.

5. Interpretation

Three features of the cross-section are economically relevant. First, Germany's aggregate rate is above the EU-27 figure, but it remains materially below the leading Nordic member states. Second, the steep size gradient indicates that an economy-wide percentage masks a much lower diffusion rate among the small enterprises that dominate the firm population. Third, sector dispersion is at least as important as the national aggregate: information-intensive activities report adoption at multiples of the rates in transportation, construction or accommodation and food service.

The narrowing German–EU gap by size is consistent with a descriptive pattern in which Germany's relative difference is concentrated more strongly among small and medium-sized covered enterprises than among large enterprises. It does not establish why. Possible mechanisms—skills, capital intensity, access to vendors, managerial capability, data availability, regulation or sector mix—are outside the information contained in these cells and require separate evidence.

For policy and market analysis, the practical implication is methodological: tracking only the national total risks missing where diffusion is broad and where it remains shallow. A useful longitudinal monitor should therefore preserve the size and sector dimensions, the source flags and any questionnaire changes instead of compressing them into one score.

6. Limitations

- Coverage excludes enterprises below ten employees and self-employed persons, the financial sector and activities outside the stated NACE boundary. The results are not rates for all businesses.
- The indicator captures whether an enterprise reports using at least one listed AI technology, not the intensity, quality, productivity contribution, investment value or risk of that use.
- The EU-27 aggregate reflects official survey weights and country composition. A Germany–EU difference is not a comparison with a typical member state.
- No standard errors are included in the frozen extract. Small differences should not be treated as statistically distinguishable without the appropriate survey-precision information.
- The German enterprise-definition note and the expanded 2025 technology set limit longitudinal comparability. This paper does not estimate a 2024–2025 growth rate.
- Sector composition and firm-size distribution can contribute to the overall rate. The descriptive tables do not decompose those contributions.
- Eurostat may revise historical cells. The frozen release preserves the values used here; later atlas values may differ and should be cited with their own data state.

7. Conclusion

The harmonised 2025 cross-section places Germany above the EU-27 aggregate in enterprise AI use, at 25.97% versus 19.95%, and eighth among member states. That headline conceals a pronounced firm-size gradient and wide sector variation. Germany's difference from the EU aggregate is 6.06 percentage points among small enterprises but 1.96 among large enterprises; across the displayed sectors it ranges from 1.07 to 12.86 points.

The results support a simple measurement principle for future work: national adoption totals should be accompanied by disaggregated, denominator-preserving evidence and explicit comparability notes. The i6eal AI Adoption Atlas will continue to observe later official revisions, while this research note remains a fixed release that can be reproduced from its accompanying analysis table.

Data availability and reproducibility

The frozen analysis CSV, bibliographic metadata and citation files are published with this note at https://i6eal.de/research-notes/firm-size-sector-gaps-enterprise-ai-adoption/. The live source projection and methodology remain available at https://i6eal.de/data/ki-nutzungsatlas/observations.csv and https://i6eal.de/data/ki-nutzungsatlas/methodology.json. The source datasets are Eurostat isoc_eb_ai (DOI 10.2908/ISOC_EB_AI) and isoc_eb_ain2 (DOI 10.2908/ISOC_EB_AIN2). The paper and i6eal-authored compilation metadata are licensed under CC BY 4.0; Eurostat source data remain subject to the European Commission's reuse terms.

References

— Eurostat (2025). ICT usage in enterprises — reference metadata (isoc_e). Updated 11 December 2025. https://ec.europa.eu/eurostat/cache/metadata/en/isoc_e_esms.htm

— Eurostat (2025). 20% of EU enterprises use AI technologies. Eurostat news, 11 December 2025. https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20251211-2

— Eurostat (2026). ICT usage in enterprises: enterprises using artificial-intelligence technologies (isoc_eb_ai). DOI: 10.2908/ISOC_EB_AI.

— Eurostat (2026). Enterprise AI use by economic activity (isoc_eb_ain2). DOI: 10.2908/ISOC_EB_AIN2.

— Statistisches Bundesamt (Destatis) (2025). Unternehmen mit Nutzung von Technologien der künstlichen Intelligenz nach Beschäftigtengrößenklassen. Data state 24 November 2025. https://www.destatis.de/DE/Themen/Branchen-Unternehmen/Unternehmen/IKT-in-Unternehmen-IKT-Branche/Tabellen/ikti-unternehmen-kuenstliche-intelligenz.html