

AI at Work: Promises, Perils and Paradoxes of Adoption

Thesis Booklet

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1 Background and Relevance

Artificial intelligence (AI) has shifted from narrow expert systems to large-scale, data-driven and—most recently—foundation-model applications. While Western European and North-American labour-market effects have been finely charted, systematic, region-specific evidence for Central and Eastern Europe—Hungary in particular—remains scarce. Addressing that gap is crucial, as the region confronts simultaneous skills shortages, productivity lags and accelerating AI diffusion.

2 Objectives and Key Hypotheses

Five verbatim working hypotheses frame the dissertation :

- H1** The academic literature is skewed towards cautious pessimism regarding AI's labour-market impact.
- H2** Senior professionals experience measurable efficiency gains from AI use, while junior professionals face displacement risks ("junior paradox").
- H3** AI adoption remains uneven across regions, firm sizes and professional seniority levels—with trust, skill mismatch and governance gaps as major barriers.
- H4** Organisational readiness for AI correlates with levels of internal trust and availability of judgment-support tools.
- H5** Without proactive policy intervention, AI will likely amplify existing labour-market inequalities rather than reduce them.

3 Research Questions, Methodology

3.1 Research Questions

- RQ1** What themes dominate academic discourse on AI and labour?
- RQ2** How is AI reshaping employment structures and skill demand?

RQ3 How does the Central-European (especially Hungarian) labour market respond?

RQ4 Which organisational adaptations enable successful implementation?

RQ5 Which policy tools can mitigate risks and support inclusive transitions?

3.2 Mixed-Methods Design

- **Scientometric meta-analysis** of 250 papers using LDA topic modelling, PageRank and sentiment mapping.
- **Qualitative fieldwork** – 20 semi-structured interviews, benchmarked against the 2023 Stack Overflow survey.
- **Large-scale NLP study** on 1 382 827 Hungarian job advertisements, classified via RegEx and DSPy pipelines.
- **“Trust My AI” survey** (n = 150) on adoption hurdles and confidence in evaluation tooling.

RQ1 was studied with the scientometric analysis, RQ2 was studied with the Qualitative fieldwork, for RQ3 the large scale NLP approach was applied, RQ4 and RQ5 was investigated with the survey method.

4 Results and New Scientific Theses

4.1 Empirical Findings

The scientometric enquiry confirms that contemporary scholarship exhibits a stable, mildly negative bias toward AI’s labour-market consequences: across 250 curated papers negative-framed statements outweigh positive ones, and this “cautious pessimism” persists through the past decade. Topic-modelling decomposes the literature into five enduring clusters—job dynamics and wage variation, productivity effects, skill transformation, algorithmic management, and robotics in industry—whose relative shares have remained remarkably constant since 2015, indicating a mature yet unsettled research agenda. Citation-network analysis further reveals a small-world structure centred on a handful of canonical papers, notably Autor (2015) and Acemoglu & Restrepo (2020), which anchor the debate over displacement versus complementarity.

Field interviews with Central-European software professionals corroborate the “junior paradox”. Respondents report routine efficiency improvements of 10–30 % when delegating boiler-plate coding and documentation to AI tools, yet emphasise that senior judgement is indispensable for task scoping, verification and remediation of model hallucinations. Several managers describe emergent “shadow IT” workflows in which developers privately exploit AI to free capacity, gains that remain invisible to formal productivity metrics unless governance

frameworks surface them . Consensus also holds that unchecked automation disproportionately erodes entry-level tasks, jeopardising the experiential ladder by which juniors mature into experts—an observation echoed in external RCTs on code-generation tools.

Quantitative vacancy mining paints a parallel picture of early-stage diffusion. Between 2019–2024 only 18 496 postings—1.34 % of Hungary’s online advert stock—explicitly or semantically reference AI competences. Adverts cluster almost entirely in Budapest; sectorally they concentrate in IT, consulting, finance and an automotive self-driving triad led by Bosch, Continental and AIMotive. Two discernible “waves” emerge: an automotive-driven peak in 2020–2021 and a smaller 2023 uptick coincident with ChatGPT’s global debut —yet generative-AI terms such as “ChatGPT” appear only 128 times, signalling that mainstream industrial integration remains nascent. Role extraction shows software engineers, data scientists and ML engineers dominating demand, but also highlights spill-over into consultants, accountants and product managers, plus a modest internship pipeline that hints at talent-pool cultivation. Methodologically, a DSPy language-model classifier captures over 3 000 AI-related adverts missed by keyword rules, underscoring the importance of semantic approaches in labour-market surveillance.

The “Trust My AI” survey adds an organisational lens: a slim majority of respondents deploy AI weekly, yet only a third describe enterprise-wide roll-out. Perceived transparency and the presence of

evaluation frameworks (RAG, ARES, Sagemaker Clarify, etc.) strongly predict up-scaling intent, with usage–trust correlation $\rho = 0.37$ ($p < 10^{-4}$). Case studies of public chatbot failures frequently surface in public discourse, reinforcing the need for reliable guardrails.

Taken all these findings together, the evidence depicts a region poised at the threshold of large-scale AI integration: senior talent and select industries reap tangible productivity dividends, but structural imbalances—geographic centralisation, junior displacement, trust deficits and governance inertia—pose clear risks to inclusive growth. The juxtaposition of cautious academic sentiment, emerging workplace efficiencies and sparse but accelerating vacancy signals suggests a window for policy intervention before adoption reaches irreversible maturity.

4.2 New Scientific Theses

T1 Literature-sentiment asymmetry: quantitative sentiment mapping shows a statistically significant tilt towards negative labour-market expectations.

T2 Validated Junior Paradox: combined interview and vacancy evidence demonstrates structural displacement risk for junior roles alongside senior augmentation.

T3 Low Market Penetration of AI Work: AI-oriented vacancies account for merely 1.34 % of Hungarian postings; generative-AI references remain marginal

T4 Trust–Adoption Link: organisational roll-out intent is strongly associated with perceived transparency and evaluation tooling.

5 Conclusions and Recommendations

5.1 Conclusions

AI simultaneously creates and displaces jobs, widens wage differentials and reproduces regional disparities. Organisational bottlenecks stem less from cost than from trust and skills; addressing these is pivotal for inclusive growth.

5.2 Policy Recommendations

Company level Deploy systematic evaluation frameworks; preserve junior pipelines; align incentives so that productivity gains are shared rather than hidden.

Country level Embed AI and critical-judgement skills into curricula; offer junior-hiring tax credits and reskilling grants; support sectoral AI pilots while improving compute and data access for SMEs.

6 Author's Publications Related to the Topic

- [1] Szabados, L. (2023). *Nyelvi Modellek a Tudás Útjain: Az Autonóm Jövő Kapujában*. In: Kiss, F., Noszkay, E., & Obermayer, N. (eds.) *A tudásmenedzsment új utakon – a MI és az upgrading összefüggésszereiben: Absztrakt kötet*. Budapest: Információs Társadalomért Alapítvány (INFOTA), p. 17. (Absztrakt)
- [2] Szabados, L. (2024). *AI's Effect on Labour: What Does Economic Literature Say?* *International Journal of Engineering and Science*, 13(5), 328–350. doi:10.9790/1813-1305328350
- [3] Szabados, L. (2024). *The Dynamics of AI Adoption – Review of “Power and Prediction”*. *Alma Mater*. (in press)
- [4] Szabados, L. (2025). *The Impact of AI Tools on the Work and Labour-Market Prospects of Programmers*. *Vezetéstudomány / Budapest Management Review*, 56(4), 42–56. doi:10.1
- [5] Szabados, L. (2024). *Ensuring Safety and Reliability in the Age of LLM Agents*. In: Yam, Y., & Baranyi, P. (eds.) *Proceedings of the International Conference on AI Transformation*. Budapest: Corvinus University of Budapest, pp. 9–9. (Absztrakt)

- [6] Szabados, L. (2025). *“AI a piacon”: Mesterséges intelligencia rendszerek adoptációja magyar álláshirdetések tömeges feldolgozása tükrében.* SZIGMA, 56(3). (in press)
- [7] Szabados, L. (2025). *Együttműködés AI ágensekkel – Mi kell a bizalomhoz?* In: *“Mi és MI” – Együttműködés a mesterséges intelligenciával a munka világában.* (Abstrakt) (in press)