Competencies for AI adoption in public administration: A demand-side study based on job postings from Germany

Gunnar Auth, Frank Bensberg, Julian P. Christ

Abstract: Digital competencies have become a central field of interest for politics, academics, and business in the last decade. The relevance and range of AI competencies for e-government have already been addressed by several studies, although generalisable empirical analyses based upon quantitative approaches are rare. The aim of the research presented in this study is to understand which competencies are needed for AI adoption in public administration from the employer's perspective. For this purpose, a large-scale analysis of N=62,028 public job postings from Germany between July and November 2023 was conducted. Based on a conceptual framework of AI in public administration, text mining methods were used to extract AI competency requirements. The results show that AI currently is not a dominant topic in the light of public job offerings in Germany, with only 0.91 % (n=565 job postings) including the term artificial intelligence ("Künstliche Intelligenz"). While this supports the assumption that AI has not yet proliferated as a cross-sectional technology within public administration and remains in an early stage, it also emphasises the need for effective measures to achieve the political goals in national and European strategy documents.

Keywords: AI Adoption, AI Competencies, Job Posting Analysis, Job Mining, E-Government

Kompetenzen für den KI-Einsatz in der öffentlichen Verwaltung: Eine Nachfragestudie basierend auf Stellenausschreibungen aus Deutschland

Zusammenfassung: Digitale Kompetenzen haben sich im letzten Jahrzehnt zu einem zentralen Interessensgebiet für Politik, Wissenschaft und Wirtschaft entwickelt. Die Relevanz und das Spektrum von KI-Kompetenzen für E-Government wurden bereits in mehreren Studien untersucht, obwohl generalisierbare empirische Analysen auf Basis quantitativer Ansätze selten sind. Ziel der vorliegenden Studie ist es, zu verstehen, welche Kompetenzen aus Arbeitgebersicht für den Einsatz von KI in der öffentlichen Verwaltung erforderlich sind. Zu diesem Zweck wurde eine groß angelegte Analyse von N=62.028 öffentlichen Stellenausschreibungen aus Deutschland zwischen Juli und November 2023 durchgeführt. Basierend auf einem konzeptionellen Rahmen für KI in der öffentlichen Verwaltung wurden Text-Mining-Methoden eingesetzt, um die Anforderungen an KI-Kompetenzen zu extrahieren. Die Ergebnisse zeigen, dass KI derzeit kein dominantes Thema im Hinblick auf die öffentlichen Stellenangebote in Deutschland ist: Nur 0,91 % (n=565 Stellenausschreibungen) enthalten den Begriff "Künstliche Intelligenz". Dies stützt die vorläufige Hypothese, dass sich

KI als Querschnittstechnologie in der öffentlichen Verwaltung noch nicht durchgesetzt hat und sich noch in einem frühen Stadium befindet. Gleichzeitig unterstreicht es die Notwendigkeit wirksamer Maßnahmen zur Erreichung der politischen Ziele in nationalen und europäischen Strategiedokumenten.

Schlagwörter: KI-Einführung, KI-Kompetenzen, Stellenausschreibungsanalyse, Job Mining, E-Government

1 Introduction

The adoption of artificial intelligence (AI) is globally assessed as a major turning point in the evolution of the public sector. By taking over human routine tasks more efficiently and effectively, AI is expected to raise productivity and create increased public value (Schiff et al., 2022; Sun & Medaglia, 2019; van Noordt & Tangi, 2023). However, achieving this value-added requires public organisations to manage substantial changes, such as transforming their organisational structure, process organisation, and culture (Akbarighatar, 2024; Tangi et al., 2023; van Noordt & Misuraca, 2022b). These transformational changes demand various resources, including complementary human capital, huge investments in technology, and a general openness to AI innovation, often referred to as AI capabilities (Mikalef et al., 2023; Neumann et al., 2024). Although AI is already infused into many public organisations worldwide, Germany is said to show a significant delay which is exemplified by the time lag in end-to-end digitalisation of public services as prescribed by the National Online Access Act. In addition, researchers, politicians, and decision-makers expect a massive and increasing shortage of skilled workers in Germany soon due to the regressive birth rate over the last decades. German public sector institutions thus need to optimise their organisational structures to deal with this scarcity. Implementing digital and automated processes driven by AI technologies offers a feasible solution to overcome scarcity-related productivity losses and predicted resource constraints (Brynjolfsson et al., 2023; O'Kane et al., 2020). The expectations of the various customer groups (e. g., citizens, companies, non-government organisations) regarding the number and quality of digital public services have also changed even more in recent years (Codagnone et al., 2019; Haug et al., 2024; Wilson & Mergel, 2022), driven by the COVID19 pandemic, the Online Access Act as legal basis for the digital modernisation of the German public administration, and recent trends in the labour market collectively addressed as New Work (Arregui Pabollet et al., 2019; Rackwitz et al., 2021). These circumstances result in massive challenges for public agencies in particular, which are under increasing pressure from the competition for human capital in times of a growing shortage of skilled workers and an aging society (e. g., Angenendt et al., 2023; Charles et al., 2022; Green, 2024; Kölling, 2022).

The revolutionary changes towards digital administration are leading to significant modifications of established role models, the competency profiles that have been set for years, and the technical requirements for positions to be filled (Distel et al., 2019; Koddebusch et al., 2022). While several qualitative studies on AI competencies and competency models for the digital economy are available, only few quantitative studies shed light on the structure and dynamics of AI competency requirements in public administration. Hence, this article ad-