


Chapter 1

AI Utilization, Workforce Dynamics, and Productivity in Turkish Banking Implications for the Circular Economy

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ABSTRACT

Purpose – This study examines the impact of AI utilisation on workforce size and productivity, and its implications for the circular economy in the Turkish banking sector. Design/methodology/approach – Data from five private banks (2014–2023) were analysed using correlation and regression methods. Workforce size was measured by employee count; productivity was based on internal performance scores. Findings – AI use significantly affects both variables. AI-driven services tend to reduce workforce size while boosting productivity. Interestingly, a positive correlation was observed between complaint rates and productivity. Discussion – AI supports sustainability via digitalization and resource efficiency, aligning with circular economy principles. However, the decline in workforce size reflects concerns in literature about AI-driven unemployment, requiring strategic planning.

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1. INTRODUCTION

The 21st-century's banking sector has been undergoing profound digital transformation (Yıldırım, 2006). This transformation is mainly moving away from traditional branch-centred models to technology-driven services model. At the first look it may be seen as a shift for increasing operational efficiency as well as increasing customer satisfaction. Nevertheless, this is a part of a broader push for sustainability and systemic change (Işkın, 2010).

In fact, in global discussions on sustainability, the concept of the circular economy has emerged as a framework for redesigning economic activities to be more regenerative and resource-efficient (Lu and Serafim, 2023). A circular economy entails moving from the linear and traditional “take-make-dispose” model toward one where resources are continuously reused, waste is minimised, and value is maintained within the system (Lu and Serafim, 2023). Achieving this transition requires rethinking how industries operate. This includes service industries like banking to improve resource efficiency, reduce waste, and leverage innovation for sustainable growth (Meena & Ganesan, 2020; Szeiner & Balázs, 2023). Digitalisation and AI play a crucial role in this process. Indeed, they are increasingly recognised as enablers that can decouple economic activity from physical resource use since it allows more output to be obtained with fewer material inputs (OECD, 2023). Indeed, both private and public sectors are called to transform their operations to address climate change, cut pollution, and improve resource efficiency, and the financial sector in particular has a central role in shifting from a linear, wasteful economy toward one that embeds circularity in finance (ConnectEarth, 2025). This context underlines that the modernisation of banking through AI and digital tools should be seen as part of a systemic sustainability transition rather than seen alone as a technological upgrade (Annisa et al., 2024).

Within the banking industry, the adoption of AI and other digital technologies has already redefined how value is delivered to the customers (Bueno et al., 2024). In this manner, banks have increasingly digitised their products and services through using internet and mobile banking to AI-driven chatbots and analytics (Gartner, 2020; McKinsey, 2019). This effectively dematerialising many banking processes that once relied on physical infrastructure. Dematerialisation in finance refers to the substitution of physical documents, cash, and in-person services with digital equivalents (Annisa et al., 2024). This trend aligns with circular economy principles by reducing the need for physical resources such as paper, branch energy use, and physical storage and rationalisation processes for greater efficiency (FasterCapital, 2025). For example, shifting to online banking and electronic statements lowers paper consumption and cuts down on the carbon footprint associated with printing and transporting documents (FasterCapital, 2025). Similarly, AI-supported digital

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