# Chapter 4
# Artificial Intelligence in Circular Economy and Green Logistics: A Bibliometric Analysis Using R Studio

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## ABSTRACT

*This chapter explores the intersection of Artificial Intelligence (AI), Circular Economy (CE), and Green Logistics (GL) as a transformative path toward sustainable industrial systems. Using R Studio (Biblioshiny), a bibliometric analysis of 70 Scopus-indexed publications (2010–2025) maps global research trends on AI in CE and GL. The analysis identifies five major research clusters: AI-enabled reverse logistics, digital supply chains and Logistics 5.0, predictive manufacturing, AI-driven decision and policy modelling, and sustainable urban mobility. Emerging themes include digital product passports, blockchain-based traceability, and low-energy AI models. The chapter concludes with recommendations for academia, industry, and policymakers to foster AI-driven, circular, and low-carbon ecosystems.*

DOI: 10.4018/979-8-3373-5946-5.ch004

## 1. INTRODUCTION

The rapidly worsening climate crisis, the shortage of resources, the rise of waste volumes has added to the world's alarm, it is unsustainable trends of production and consumption. As a reaction to this, the Circular Economy (CE) has already become a paradigm of transformation that aims to decouple economic development with resource depletion and focus on restorative and regenerative activities, including reducing, reusing, recycling, and remanufacturing (Remyha & Pryimak, 2025). In the same manner, Green Logistics (GL) is a strategic change in the supply chain operations that tries to make supply chain operations environmentally friendly by minimizing energy consumption, lowering emissions, and maintaining sustainable flow of resources during product lifecycles (Challouf et al., 2025). In this changing sustainability discussion, Artificial Intelligence (AI) is also a focal technological facilitator that aids intelligent automation, optimization, and observation of circular and green logistics systems (Schlueter et al., 2023). By incorporating the digital technologies like AI, IoT, and blockchain, a company will have the ability to increase the level of transparency, traceability, and resource efficiency throughout the global supply streams (Ge, 2024).

The concept of Artificial Intelligence (AI) and such methods as machine learning, deep learning, computer vision, and natural language processing have transformed the way companies handle information, materials, and processes. With the combination of AI and the use of other innovative technologies, including the Internet of Things (IoT), Big Data Analytics, Blockchain, and Cloud Computing, organizations can progressively form self-regulating systems to optimize the routes, anticipate demand, recognize the recycling prospects, and efficiently manage waste streams (Shah & Ganesh 2025; Shah 2025). All these digital changes are based on the general shift between Industry 4.0 and Industry 6.0 and are improving the performance of real-time decision-making, predictive maintenance, and circular logistics (Fernández-Miguel et al., 2025). Energy efficiency and sustainability performance is also reinforced by the use of AI-based solutions in manufacturing and logistics, specifically in small and medium-sized enterprises (SMEs) (Alkhodair & Alkhudhayr, 2025). Taken together, these developments are consistent with the United Nations Sustainable Development Goals (SDGs) and the overall global carbon neutrality to highlight the strategic importance of AI as a technological and a governance tool towards achieving circularity and sustainability in logistics and manufacturing (Kulova et al., 2024).

According to recent studies, there is increasing importance of Artificial Intelligence (AI) to optimize circular and green supply chains. Research notes that AI-based reverse logistics facilitates effective resource recovery by means of predictive analytics, autonomous sorting and remanufacturing (Raut et al., 2025). Practices