

Mapping the Cost and Revenue Structure of Circular Economy Business: A Framework Based on LLM-Assisted Scoping Review

Hirotsugu Kitada

Associate Professor

Faculty of Business Administration

Hosei University, Tokyo, Japan

kitada@hosei.ac.jp

Abstract

Circular Economy (CE) has emerged as a strategic approach to address resource scarcity, climate change, and waste issues by transforming linear business models into circular ones. However, despite the global development of disclosure standards such as the Global Circularity Protocol (GCP), the financial implications of CE—particularly the relationship between risks/opportunities and cost/revenue structures—remain insufficiently understood. This study proposes a conceptual framework to analyze the financial structure of CE business models. Drawing on a scoping review assisted by a Large Language Model (LLM), we systematically examine existing literature related to CE and its cost implications. Our review identifies four key components of CE-related financial structure: (1) existing cost reduction through efficiency and material reuse, (2) additional costs such as design, reverse logistics, and compliance, (3) traditional revenue from products, and (4) new revenue streams driven by service-based or enabling businesses. We further illustrate how this framework can be applied to compare industrial strategies and policies by mapping specific cost items and financial impacts across the value chain. Our findings provide a foundation for evaluating CE strategies from a management accounting perspective, supporting both academic inquiry and practical decision-making in sustainability transitions. Future research will incorporate corporate interviews to assess the framework's applicability in real-world business contexts.

Keywords

Circular Economy, Cost Structure, Risks, Large Language Model.

Acknowledgements

This research was supported by the Environment Research and Technology Development Fund (JPMEERF1-2402) of the Environmental Restoration and Conservation Agency, provided by the Ministry of the Environment of Japan, and by JSPS KAKENHI Grant Numbers JP23K26329 and JP25K00686.

Biographies

Hirotsugu Kitada is an Associate Professor of Accounting at Hosei University in Tokyo, Japan. His research primarily explores how management accounting systems can support corporate sustainability and the transition toward circular economy (CE) business models. He has published academic work on cost behavior, ESG disclosure, and sustainability-oriented control systems. His recent projects focus on the financial implications of CE, including the development of frameworks for mapping cost and revenue structures and evaluating circular strategies from a financial perspective. Associate Professor Kitada is actively engaged in international sustainability standard-setting initiatives, including contributions to the development of the Global Circularity Protocol (GCP), in collaboration with organizations such as ISO/TC323 and the World Business Council for Sustainable Development (WBCSD). He also

utilizes emerging AI technologies, particularly large language models, to conduct scoping reviews and analyze narrative disclosures in integrated and sustainability reports.