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Thesis abstract

Bridging the gap: A macro level approach to assessing and advancing the circular economy

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Circular economy is praised as a solution to the negative impacts of increased resource use. Although existing research has examined circular practices at micro and meso levels, there is a lack of comprehensive analyses that connect the levels and consider broader systemic impacts. As circularity is fundamentally a macro level phenomenon requiring coordination among various actors, there is a need for a better understanding of these interactions and more robust methods to evaluate and compare the diverse contributions to circular resource use. This dissertation addresses these gaps by exploring the following research question: How can circularity be assessed and advanced holistically?

After establishing the theoretical background of circular economy and related strategies (Chapter 2), this dissertation presents three chapters that form the basis of the main contribution to knowledge.

Chapter 3 uses National Business Systems (NBS) theory to explore how macro level factors and configurations affect the adoption of circular economy practices in different capitalist systems, with case studies from the United Kingdom (UK), Germany, and France. The analysis shows that the development and implementation of circular economy measures necessitate an encompassing consideration of the NBS in which they are embedded.

Building on the macro level conceptualisation, the question arises of how to assess, summarise and compare the different contribution of micro level actors. Chapter 4 explores the opportunities of machine learning (ML) to analyse these contributions by using nonfinancial disclosures. This chapter introduces a semi-supervised ML approach based on word embeddings and the Term Frequency-Inverse Document Frequency (TF-IDF) weighting scheme to reveal the intricacies of circular economy reporting.

Chapter 5 presents an empirical case study focusing on the automotive industry due to its reliance on virgin resources and vulnerability to supply chain disruptions. Using the semi-supervised ML approach, it analyses 406 sustainability reports from 32 car manufacturers between 1998 and 2023. It contributes methodologically by linking macro and micro levels of reporting and empirically by revealing industry progress in waste reduction and remanufacturing practices.

This dissertation advances theorisation of circular economy as a multilevel phenomenon and offers a methodology for assessing circularity that incorporates multiple levels of analysis. By shifting from micro and meso to the macro level, the dissertation enhances

theory development and understanding of the practice of circular economy's potential to reduce resource use.

This dissertation supports policymakers in more efficient policymaking and offers a method to assess policy implementation. For practitioners, it recommends adapting circular practices to macro level contexts and offers a tool to improve circular practices and reporting to align with evolving policies.

Limitations pertain to data quality in circular economy reporting and relatedly limitations of the ML model employed. Future research could address these issues by using primary data sources, exploring advanced ML techniques such as large language models (LLMs), and expanding the scope to different industries.

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