Institutional Complementarities and Technical Innovations in the Plastic Recycling Firms: An Analysis of Germany's Circular Economy Model Through Investigating Multidimensional Coordination Efforts

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With a plastic recycling rate of 63.2%, Germany is well known for being a leader in environmental sustainability (EEA, 2023). At the same time Germany is one of the world's biggest producers of plastic waste, even with sophisticated recycling technologies and strict environmental regulations such as the DSD Extended Producer Responsibility (EPR) system in place. This is exemplified by the fact that the majority of this waste is exported rather than recycled domestically (Strobel et al., 2023). Why do even the most technologically advanced countries with stringent environmental regulations struggle to effectively reduce plastic waste? This study aims to explore the paradox that, while Germany's ambitious recycling targets are commendable, economic pressures, policy loopholes, and market dynamics often prevent these goals from being realized. Often in environmental regulation, those who are regulated are not victims but beneficiaries. As Stigler (1971) has stated, "[a]s a rule, regulation is acquired by the industry and is designed and operated primarily for its benefit." This research aims to expose the distributional effects of environmental policy and examine how institutional complementarities and technical innovations interact to shape Germany's recycling landscape, while emphasizing the institutional economic perspective to uncover practical challenges in transitioning to a circular economy.

Objectives and Research Questions

The research project has four main objectives. Firstly, it seeks to analyze how institutional complementarities—coordinated actions between government agencies and private recycling firms—affect the operational efficiency of recycling systems and propose a reversed waste hierarchy that better reflects actual recycling efforts. It will also examine why loopholes have been created through concurring legislation (Treibhausgas-Emissionshandelsgesetz) that benefited investments in refuse-derived fuel (RDF) power plants, undermining actual recycling capability (Gandenberger et al., 2014). Secondly, given that attractiveness of recycling plastics often competes with virgin plastic and fluctuating oil prices (Merrington, 2017), this study will examine the impact of the economic incentives of firm-level recycling decisions on the issue of waste export. Thirdly, this project investigates how public participation initiatives such as the Green Dot system, or DSD, shape consumer behaviors and contribute to—or hinder—sustainability, given the suggestion that a visible recycling infrastructure may paradoxically lead to higher consumption (GVM, 2019). Finally, this study will explore the integration of recycled plastics into secondary markets as a pathway to a circular economy, with a particular focus on the automotive sector which constitutes the third biggest secondary market (Fraunhofer, 2021).