Can the frog become a prince? A Hierarchical Model for Advancing Circularity in Plastic Packaging

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Abstract:
The environmental impact of plastic waste has triggered an urgent call for sustainable solutions that minimize waste and optimize resource use, aiming to establish a closed-loop system where materials are continually reused, recycled, and repurposed. Transitioning to a circular economy (CE) requires effective frameworks and reliable indicators to monitor progress and guide improvements. The development and standardization of these metrics are crucial to align academic research with regulatory and practical applications, driving more sustainable practices in the industry. The circularity of plastic packaging is a critical issue, as this sector represents the largest share of global plastic consumption, yet its recycling rates remain low. In response, this study proposes a hierarchical model designed to monitor and enhance the circularity of plastic packaging. This model incorporates the lifecycle phases of plastic packaging while considering key stakeholders and the broader context of national (Colombian) and international factors such as market dynamics and legislation. This work used a mixed-methods approach, including bibliometric and content analysis. The research uncovers the diverse concepts and challenges the plastic packaging industry faces. The proposed model presents a novel, scalable tool that integrates these lifecycle phases and the main actors in the circular economy. It offers a practical framework for organizations to improve their circularity efforts. By bridging the gap between theoretical frameworks and industry application, this work contributes to developing actionable tools to drive systemic change in the plastic packaging sector, moving it closer to a truly circular economy.