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Doctoral Dissertation
Doctoral Program in Management Engineering (37th Cycle)

Environmental Sustainability in Industrial Electronics:
*An empirical investigation of different strategic inter-firm
relationships*

By

Flavia Cicerelli

Abstract

This PhD dissertation seeks to advance our understanding of how relationship management practices can be leveraged to achieve sustainability targets within the Electrical and Electronic Equipment (EEE) sector. By addressing the interplay between power dynamics, information asymmetries, and collaborative mechanisms, this work develops a comprehensive framework for analysing how firms address the complexities of multi-tier supply chains to meet environmental sustainability goals. The research adopts a boundary-spanning perspective, integrating internal and external factors shaping sustainability outcomes, and positions commitment as a key determinant in the choice and effectiveness of relationship management strategies for environmental sustainability.

Commitment, defined as the degree of dedication, effort, and resource allocation that firms devote to advancing sustainability within their supply chains, is conceptualized in this study as a continuum that reflects the depth and intensity of inter-organizational interactions. This continuum spans from transactional engagements, characterized by basic compliance and minimal collaboration, to fully integrated partnerships that entail profound coordination and shared objectives. This research examines how varying levels of commitment shape the design and implementation of strategies to communicate, negotiate, and enforce sustainability objectives across supply chain networks. Utilizing a mixed-methods approach, including qualitative case studies and quantitative analysis, this dissertation investigates three sustainability commitment levels: engagement, integration, and formal collaboration.

The findings reveal that at the engagement level, power dynamics – characterized by active and passive forms and uses of power – are pivotal in cascading sustainability requirements in the upstream supply chains. To achieve



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this, focal firms often leverage active power to exert influence over their suppliers, but power asymmetries often hinder upstream adoption, especially when these suppliers can exploit passive power. These insights extend the theoretical understanding of power asymmetries in multi-tier sustainable supply chain management and highlight the strategic importance of balancing coercive and collaborative practices.

At the integration level, the study examines the role of Green Information Systems (GIS) in reducing information asymmetries and data ambiguity, thus mitigating eco-opportunism and fostering data-driven green product innovation. While GIS enhance data management within firms, information sharing between firms and, finally, comparability across firms, barriers such as non-standardized metrics and data-sharing reluctance limit their effectiveness. Therefore, this research underscores the dual role of GIS as both enablers of coordination and tools for fostering sustainability innovation across dispersed supply chain tiers, while highlighting the need for structural systemic changes.

At the highest commitment level, i.e. formal collaboration, the analysis focuses on Alliance Portfolio Diversity (APD) as a strategic mechanism for improving corporate environmental performance. The findings demonstrate that diverse partnerships – spanning technological, functional, and industrial domains – enhance firms' ability to develop sustainable innovations, reduce emissions, and improve resource efficiency thereby contributing to improving the overall corporate environmental performance. Notably, the impact of APD varies by firm characteristics, such as age and maturity, offering nuanced insights into how collaborative strategies drive sustainability outcomes.

This dissertation contributes to the literature on corporate sustainability and sustainable supply chain management by integrating power dynamics, information systems, and alliance strategies into a cohesive framework. It provides theoretical and practical insights into how firms can address the environmental challenges inherent in the EEE sector. By advancing understanding of commitment levels and their associated relationship management strategies, this work offers actionable guidance for firms addressing the complexities of multi-tier supply chains in pursuit of environmental sustainability.