

# **Improving Waste Management Operations in the Oil and Gas Industry through Reverse Logistics**

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## **Abstract**

This doctoral dissertation investigates the role of reverse logistics in improving waste management operations within the oil and gas industry, with a focus on operational efficiency, regulatory compliance, and environmental sustainability. Despite its strategic relevance, reverse logistics implementation in this sector remains fragmented and underexplored.

The study adopted a qualitative multi-method approach combining a systematic literature review, semi-structured interviews, and multiple case studies across six oil and gas companies. Data analysis applied grounded-theory-inspired coding to identify patterns and core themes.

Findings demonstrate that reverse logistics plays a critical role in structuring waste management operations. Key drivers include regulatory requirements, cost considerations, corporate sustainability objectives, and stakeholder pressure. Significant barriers were also identified, including fragmented organizational responsibilities, limited infrastructure, insufficient contractor integration, and uneven adoption of digital technologies. Outsourcing emerged as a dominant practice, yet the absence of structured decision-making frameworks often limits its effectiveness.

The study further highlights the growing importance of Industry 4.0 technologies in advancing reverse logistics, including digital waste tracking systems and integrated information platforms. Based on empirical and theoretical findings, the dissertation proposes practical recommendations for designing reverse logistics networks, emphasizing waste stream mapping, transportation optimization, technology integration, and stakeholder collaboration.

This dissertation contributes to the literature by extending reverse logistics theory to the oil and gas sector and providing empirical evidence from multiple organizational contexts. It positions reverse logistics as a central mechanism for achieving sustainable and efficient supply chain management in the oil and gas industry.

**Key words:** reverse logistics; waste management; oil and gas industry; supply chain management; sustainability