

THE ROLE OF THE BUSINESS ENVIRONMENT IN SHAPING ECOSYSTEMS: EVIDENCE FROM EMERGING PORT-BASED HYDROGEN SYSTEMS

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Extended Abstract

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Abstract Summary

This study investigates how macro-context conditions relate to ecosystem configurations in port-based hydrogen systems. Hydrogen is widely recognized as a key enabler of the energy transition, particularly for decarbonizing hard-to-abate sectors and reshaping existing energy value chains. Within this context, ports play a crucial role by acting as strategic nodes that connect geographically dispersed producers and consumers, enabling cross-border energy flows. However, the transformation of ports into hydrogen hubs is complex, as port environments are characterized by multiple interdependent actors and activities requiring coordinated development and governance.

While prior literature has conceptualized ports as ecosystems to capture such interdependencies, limited attention has been devoted to understanding how the broader context in which these ecosystems are embedded influences their configuration. Addressing this gap, the study adopts a macro-context perspective to analyze how contextual conditions shape ecosystem structures.

The research employs an exploratory qualitative multiple-case design, focusing on port-based hydrogen ecosystems as units of analysis. Cases are selected based on a logic of controlled variation: all share a common infrastructural basis but differ in macro-context conditions. The macro-context is operationalized through four dimensions, namely, regulatory context, market conditions, geopolitical relevance, and infrastructure base, while ecosystem configurations are reconstructed using an ecosystem-as-structure approach.

The analysis reveals systematic variations in ecosystem configurations across cases. Differences emerge in the scope of the activity system, the framing of the value proposition, and the organization of actors. These variations appear to be associated with differences in macro-context conditions, suggesting that ecosystem configurations do not converge toward a single model but reflect context-specific combinations of factors.

Overall, the study contributes to bridging ecosystem research and contextual perspectives, highlighting the importance of considering macro-context conditions in understanding the development of port-based hydrogen ecosystems.