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Mapping Functional Roles in Manufacturing Innovation Ecosystems*

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Abstract

Innovation ecosystems in manufacturing regions are often analyzed through structural actor mappings, yet little is known about how different stakeholders functionally contribute to key stages of industrial innovation. This gap limits our understanding of the ecosystem's operational capacity, particularly in production-oriented contexts where applied R&D, scale-up, and technology deployment require coordinated multi-actor involvement. To address this gap, the study introduces the *Manufacturing Innovation Ecosystem Actor × Value Contribution Matrix* as a conceptual tool for evaluating the differentiated roles of six core stakeholder groups: manufacturing SMEs, lead manufacturing firms, industrial clusters, universities, incubators, and technology transfer offices. These actors are assessed across five critical innovation functions: applied R&D, process innovation, manufacturing scale-up, technology deployment, and industrial demand generation. The matrix was developed through a theory-informed assessment using qualitative scoring to map functional intensities and interdependencies. The analysis reveals patterns of specialization, with lead firms and intermediaries (clusters, TTOs) emerging as multi-functional actors, while SMEs and universities remain limited to narrower roles. Coordination asymmetries and weak translational linkages between knowledge producers and adopters were identified as structural limitations. However, the study also uncovers complementarities and collaboration potential across actor groups. The results contribute to innovation ecosystem research by shifting attention from structural presence to functional value creation. The findings offer actionable insights for ecosystem governance, suggesting that strategic alignment, enhanced intermediation, and empowerment of multi-functional actors can foster greater coherence and systemic performance in manufacturing innovation environments.

Keywords: manufacturing innovation, innovation ecosystems actors, value contribution matrix, functional mapping

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