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TECHNOLOGY ROADMAPPING AND REGIONAL INNOVATION POLICY: Lessons from the Semiconductor Sector in Southern Brazil

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Introdução

The semiconductor industry has become central to contemporary technological and geopolitical agendas. Despite its projected growth, the sector remains structurally vulnerable due to the concentration of critical stages of the value chain in a small number of firms and countries. Recent global disruptions have exposed the fragility of globally fragmented production networks and prompted governments to reassess their industrial strategies. In this context, emerging economies face the dual challenge of reducing structural dependency while fostering sustainable technological capabilities.

Problema de Pesquisa e Objetivo

This paper examines how Technology Roadmapping (TRM) can be operationalized as a policy instrument to support capacity building in strategically sensitive sectors.

Fundamentação Teórica

Various studies have tailored TRM beyond firm-level applications, emphasizing its utility in orchestrating diverse stakeholder interests and operationalizing long-term policy objectives (Ahlqvist et al., 2012; Kerr et al., 2013). From this perspective, three dimensions of stakeholder engagement to assess their level of involvement in TRM processes were identified (Chakraborty et al., 2022): (1) Breadth - number of different key stakeholder groups involved; (2) Depth - diversity of methods used to engage stakeholders; and (3) Timing - stage at which stakeholders are engaged in the process.

Metodologia

Drawing on an in-depth case study of the Brazilian state of Rio Grande do Sul - home to the country's only operational chip manufacturing plant and a dense microelectronics ecosystem - the study presents the development and outcomes of a year-long TRM process involving interviews, Delphi surveys, and a multistakeholder workshop.

Análise dos Resultados

The results highlight how TRM can go beyond foresight, serving as a tool for aligning governance mechanisms, mobilizing local capabilities, and integrating policy design across levels of government.

Conclusão

This study offers three main contributions: (1) it provides an in-depth empirical account of how TRM can be adapted and applied by subnational governments to guide sectoral development in a geopolitically sensitive industry; (2) it sheds light on the institutional arrangements, governance mechanisms, and stakeholder alignments required to mobilize local capacities in structurally dependent regions; (3) the study proposes an analytical framework that integrates TRM with broader policy objectives, emphasizing its role not only as a foresight tool but as an instrument for building state capacity.

Contribuição / Impacto

The paper contributes to the literature on innovation policy in late-industrializing contexts by proposing an analytical framework that positions TRM as both a strategic planning method and a mechanism for strengthening state capacity, institutional coordination, and technological sovereignty.

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