

Financial Sustainability in Distributed Research Infrastructures: A Systems-Based Assessment of the Romanian METROFOOD Node

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ABSTRACT

Distributed research infrastructures constitute a strategic component of the European Research Area, particularly within the ESFRI framework. Operating through geographically dispersed nodes under coordinated governance structures, these infrastructures are designed to support scientific excellence, innovation, and socio-economic development. However, ensuring long-term financial sustainability beyond initial project-based funding remains a structural challenge. Existing literature addresses innovation management and governance in research infrastructures but offers limited integrated financial sustainability models tailored to distributed configurations. Most studies focus either on funding mechanisms or policy frameworks, without conceptualizing research infrastructures as dynamic financial systems characterized by interdependent funding flows, cost structures, governance mechanisms, and reinvestment cycles. This study aims to assess the financial sustainability of the Romanian METROFOOD node through a systemic analytical framework. The research pursues three objectives: (1) to analyze the financial architecture and cost structure of the infrastructure; (2) to evaluate revenue diversification mechanisms and funding dependencies; and (3) to propose an integrated sustainability framework applicable to distributed research infrastructures operating in emerging economies. The paper develops a Financial Sustainability Integrated Ecosystem (FSIE) framework, which conceptualizes sustainability as the dynamic interaction between four interconnected dimensions: financial flows (public funding, competitive grants, service revenues, partnerships), cost and resource allocation structures, governance and coordination mechanisms, and value creation–reinvestment processes. This systemic perspective allows for a holistic evaluation of long-term viability rather than a static assessment of short-term funding adequacy.

JEL Codes:

Keywords: *Financial sustainability; Distributed research infrastructures; ESFRI; Governance; Research infrastructure funding; Systems approach; METROFOOD.*