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From Policy Rhetoric to Quadruple Helix Stakeholder Realities: PEST Barriers to Open Innovation in Regional Food Systems

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Abstract

Open innovation is increasingly promoted in European food policy as a key mechanism for advancing sustainable food system transitions (European Commission, 2020). By enabling collaboration across public authorities, industry, academia, and civil society, open innovation is critical for mobilising diverse knowledge and resources to address interlinked challenges of biodiversity loss, climate resilience, and food security (Krasnokutska et al., 2025). Yet, despite its strategic importance, open innovation remains unevenly implemented in regional food systems. There are barriers that hinder it. We conduct a mix-method study to identify the barriers and investigate their importance among the key stakeholders. We find an important misalignment that has to be addressed. On the first stage of the study qualitative method was applied, fifteen semi-structured interviews were conducted with regional food policy representatives from Finland, Spain, Italy, Greece, and Poland. The interviews were thematically analysed following Braun and Clarke's (2006) approach, using a political, economic, social, and technological (PEST) framework to systematically capture the multidimensional nature of the challenges identified. This analysis resulted in the identification of seventeen PEST-related barriers to open innovation in regional food systems. In the next stage, a multi stakeholder survey (n = 296) was administered across the same regions. Public authorities, businesses, research organisations, and civil society actors rated the influence (1 = no influence; 5 = strong influence) of PEST-barriers in open innovation initiatives in local food systems. According to our result there is significant between-group differences ($p < 0.01$). Civil society actors perceived social and power-related barriers as the most restrictive (M = 4.3), while public authorities reported substantially lower barrier salience (M = 3.1). The findings indicate that policy-makers recognise structural misalignments, such as EU–national policy frictions and short funding cycles, but tend to underestimate the constraints experienced by other key sector actors. Political and economic barriers were most salient for industry actors, whereas social and technological barriers most strongly constrained civil society and academia. By bridging policy perspectives with diverse stakeholder realities, this study reveals systematic perception gaps among public authorities, particularly the underestimation of other actors' readiness, support, and capacity for collaboration. Such misperceptions can actively constrain open innovation by discouraging engagement and risk-taking. This misalignment raises important questions about how public authorities support open innovation in food systems, given their central role in shaping the ecological sustainability of regional activities and influencing the behaviour of other local stakeholders (Dioba et al., 2024). In this sense, misperceived stakeholder preferences may operate as a governance-level analogue of the spiral of silence, reinforcing institutional caution and maintaining the status quo, aligned with recent evidence showing that public authorities often underestimate public support for

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sustainability transitions and related policy measures (Tanase et al., 2026).

Keywords: Quadruple Helix stakeholders, local food systems, open innovation

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