

Next Generation EU: academic research and regional disparities in Italy - A social network analysis.

University research networks have become a pivotal part of the modern academic and innovation landscape. Innovation activities are increasingly open and networked (Hewitt-Dundas, 2012), fostering collaborative arrangements in which universities are embedded (Smith et al., 2023; Akbaribatar et al., 2018), significantly increasing their access to public research funds. The growing trend toward collaboration has reshaped university research, with profound policy implications.

Given the importance of collaborative arrangements in the distribution of public funding and their impact on universities' performance, knowledge creation, and innovation patterns, economic analyses seek to understand the mechanisms behind the formation of collaborative ties (Bergenholtz & Waldstrøm, 2011; Lomi et al., 2014; Lomi & Pattinson, 2006; Chompalov et al., 2002) and their influence on organizational behavior and performance (Gulati & Gargiulo, 1999; Powell et al., 1996). However, while much research has focused on university-industry partnerships due to their economic and social impact, university-university collaborations formed through research-funded projects remain underexplored (Smith et al., 2023). This is particularly true for smaller or peripheral universities, often located in less developed regions, despite their crucial role in fostering local development through knowledge production, resource sharing, and institutional capacity-building.

For smaller and peripheral universities, participating in research networks provides an opportunity to overcome challenges such as limited resources, geographic isolation, and institutional size. Identifying the key determinants of university participation in collaborative partnerships and assessing their relative importance is essential for evaluating institutional performance and regional development. It is also crucial for designing targeted policies that address disparities and enhance the capacity of peripheral universities to improve in key areas. The role of institutional and macroeconomic factors in shaping inter-university differences in performance and collaboration is well-documented in the theoretical and empirical literature.

This paper examines the formation of inter-university collaborative ties within the Partenariati Estesi (EPs), a strategic initiative under Italy's Piano Nazionale di Ripresa e

Resilienza (PNRR), funded by the European Union through the Next Generation EU program. EPs aim to strengthen collaboration among universities, research institutions, and firms, with a particular focus on underfunded and peripheral areas, bridging the gap between strong and weaker institutions. Specifically, we address three research questions:

RQ1: What role do geography and internal university characteristics play in the formation of collaborative ties?

RQ2: How does local institutional quality influence the likelihood of universities participating in EPs?

RQ3: For universities involved in EPs, which factors most affect their centrality within the network?

To investigate these questions, we construct a dataset combining information from ETER, Censis, Clarivate, and Nifo & Vecchione (2014). Our final sample includes 87 Italian universities, both public and private. The empirical analysis consists of two parts. First, we apply social network analysis (SNA) to examine the hierarchical structure of EPs, providing insights into the overall network dynamics and inter-university relationships. Second, using a logit estimation and a two-stage Heckman selection model, we identify the key factors influencing both university participation in EPs and their network centrality.

Interestingly, we find that while research quality positively correlates with both participation probability and network centrality, other structural factors—such as university size and geographic centrality—play a more significant role. Overall, our results show that EPs collaborative ties are concentrated among a few large, centrally located universities in regions with higher institutional quality, rather than being evenly distributed across the system. These findings raise a crucial issue for the achievement of the EPs targets set by Italian policymakers.