

## **Social Networks and Regional Economic Development: Cities and Networks (Session 12; Part 3)**

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### **Polycentric urban systems: a multidimensional approach of networks**

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Polycentric urban systems: a multidimensional approach of networks

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The goal of this research is to uncover territorial patterns of urban centralities in Portugal and to understand how the organization and the interaction of the territories can promote their development. Using a multidimensional approach, through the analysis of social networks, the territory is problematized, not only from the perspective of the resources dimension, but also from the perspective of flows, networks and community detection.

One of the current challenges at European level is the promotion of polycentric urban systems, more connected and collaborative. Attention is focused on the ability of territories to streamline their strategic resources and to explore complementarities between them, enhancing their growth and competitiveness. Thus, the analysis of urban systems is based on multifunctional and relational approaches that explore the power of attractiveness of territories and the development of networks of flows and cooperation.

From this theoretical framework and with the purpose of detecting centralities, this work was based on different types of relationships, capable of translating diverse types and levels of centrality. On the one hand, flows of people were used to analyze the power of attractiveness of the different territories and to identify the territorial communities: the commuting movements (home-work and home-school) and the mobility of students of higher education levels (national scale) and the Erasmus program (European scale). On the other hand, information from organizational networks (based on cooperation projects between organizations) was used, seeking to identify the centralities and territorial networks regarding leadership and the capacity to stimulate processes of economic innovation.

Using the NodeXL program, a detecting network communities method was applied to each of the networks, in order to perceive patterns of relationship between the municipalities and to identify the structuring and influencers nodes (municipalities) of the relational behavior (network). Then, using the Geographic Information Systems, the networks of flow, the centralities and the communities were mapped, in order to identify patterns of territorial organization of the urban system.

Burger, Martijn J.; Knaap, Bert Van Der e Wall, Ronald S. (2013). Polycentricity and the Multiplexity of Urban Networks, European Planning Studies, ESPON (2005). ESPON 111, Potentials for polycentric development in Europe, ESPON & NordRegio.

Marques, Teresa (2004). Portugal na Transição do século XX/XXI: Retratos e Dinâmicas Territoriais, Porto, Afrontamento.

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