

Synergy and Complementarity in Technology-Intensive Manufacturing Networks

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Abstract : This study explores the dynamics of synergy and complementarity within city networks, specifically focusing on the headquarters-subsidary relations of firms. We begin by defining these two types of networks and establishing their pivotal roles in shaping city network structures. Utilizing the mesoscale analytic approach of weighted stochastic block modeling, we discern relational patterns between city pairs and determine connection strengths through statistical inference. Furthermore, we introduce a community detection approach to uncover the underlying structure of these networks using advanced statistical methods. Our analysis, based on comprehensive network data up to 2017, reveals the coexistence of both complementarity and synergy networks within China's technology-intensive manufacturing cities. Notably, firms in technology hardware and office & computing machinery predominantly contribute to the complementarity city networks. In contrast, a distinct synergy city network, underpinned by the cities of Suzhou and Dongguan, emerges amidst the expansive complementarity structures in technology hardware and equipment. These findings provide new insights into the relational dynamics and structural configurations of city networks in the context of technology-intensive manufacturing, highlighting the nuanced interplay between synergy and complementarity.

Keywords : city system, complementarity, synergy network, higher-order network

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