Proximity and Cluster Effects: The Case of Emerging Biotechnology Innovation Networks

Literature maintains that proximity has strong impacts on enhancing interactive learning and innovation in the clusters (Howells, 2002). Spatial proximity (distance) can be important sources of knowledge spillover, but other dimensions of proximities (cognitive, institutional, organizational and social dimensions) are equally important (Boschma, 2005; 15.   Boschma, R., and K. Frenken. 2010; Omobhude and Chen 2019). However, what is less clear is how do interactions occur in the networks to develop linkage between actors and how do cluster effects enhance the collaborations in emerging high-tech sectors? To explore the associations that regional cluster brought to enhance the formation of R&D networks in the emerging high-tech sector, this paper examines the R&D collaboration network of biotechnology industry in Taiwan between 1998 and 2017. Combining more than 50 interviews and applying social network analysis on a longitudinal dataset gathered from financial reports of 180 emerging biotechnology firms who have initiated public offering (IPO) in Taiwan, this paper aims to explore the R&D collaboration networks between the actors in the innovation system to understand whether cluster effects would enhance the R&D collaborations in the high-tech science-based sectors. Comparing the networks of the firms in this group, a shift from relative sparseness in 1998-2007 to connectedness in 2008-2017 can be readily observed. The finding of this paper suggest that while the nascent sector stays in a small size, geographical proximity is not the most important factor to determinate the networking establishments between the actors in the innovation system. In contrast, the technological distance, the fit of specialties and the mutual complementary of the business is the key factor to drive the formation of collaboration networks and alliances in the biotechnology sector- a science-based sector. To further enhance the collaboration network in a nascent science-based sector, cluster effects through policy intervention attempting to stimulate the collaboration networks between the actors may not be the mostly efficient enhancement. Instead, the strength of local knowledge base, shorten the technological distance, and enhance the mutual complementary between the actors would be most important enhancements to strengthen the local collaboration networks and the knowledge transfer in the networks. Future technology policy to promote emerging sectors needs to focus on building the capabilities of the local sector, taking into account the distinct structural features of local innovation context, rather than copying policy models from the successful experiences from other sectors or from other countries.