

## Embeddedness of Innovations: The Mechanisms of Industrial Upgrading of IC Industry in Taiwan

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Since the rapid decline of the global semiconductor markets in 2000, the restructuring of the global production networks in this industrial field made Taiwan semiconductor firms have caught up with the technology of world leading IC firms even faster than before. Since then, the global and local technological collaborations among the firms in the semiconductor industry have increased greatly, and the patent innovations of this industry in Taiwan have grown rapidly as well. Consequently, innovations have become the dominant belief of industrial upgrading in this industry. Previous literatures on organizational sociology already found that the characteristics of a firm in the inter-organizational technological collaboration networks affected the firm's subsequent innovation output. This paper will propose a framework of inter-organizational technological collaboration networks on patent innovations with considerations of Taiwan contexts. We build up the longitudinal data on a firm's ego technological collaboration networks and patents from 2001 to 2009, and attempt to examine the effects of the network mechanisms of technology leverage networks on the patent innovations. The state role (or collaboration ties with *Industrial Technology Research Institute*, ITRI) is getting declining in the patent creation, and those weaker or smaller firms tend to depend on more collaborative ties with ITRI. However, the status signal mechanism seemed to become more important in the patent innovations. Those firms with more overlapping technological collaboration ties with other firms in Taiwan semiconductor industry tend to create more patents. The path dependence mechanism (measured by repeated ties with the same collaborators) still plays important role in keeping trustful technology knowledge sharing relations which are advantageous for the subsequent patent innovations. These mechanisms of inter-organizational technological collaboration networks on patent innovations tend to vary before and after 2005. Compared these effects before 2005, state role on patent innovation seems to revive, status signal effects on patent innovation tend to decline slightly, embeddedness effects on patent innovation decrease significantly, and the mid-stream importance on patent innovation in semiconductor industry is not so important as that before 2005.