

The co-evolution between firms innovative capabilities and higher education institutions. The case of mechatronics.

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### **Abstract:**

This work investigates the effect of higher education institutions on the development of firms innovation capabilities. More specifically we study the effects of the School of Mechatronics Engineering of the University of Reggio Emilia in the North of Italy, constituted in late Nineties, on the innovative abilities of firms belonging to the mechatronics cluster of Reggio Emilia and to the regional productive system of the Emilia-Romagna region. This work seeks to contribute to the understanding of the co-evolution processes between technology and institutions (e.g. Nelson 1994, 1995, Nelson and Sampat 2001).

Mechatronics is a new technological field that emerges by the integration of informatics, electronics and mechanics, in which “the whole is greater than the sum of the parts [...], the design process has led to a product which not only performs at a better level than previously, but also would have been completely unobtainable hitherto” (Hewitt 1993, p.3). The development of mechatronics may be interpreted as a change in technological paradigm rather than technological trajectory evolution (Dosi 1982, Freddi 2009). The mechatronic cluster of Reggio Emilia generated on the shoulder of the traditional mechanical cluster and his development is grounded on two main factors: a centralized designing process based on in-house research centers rather than cooperations with other firms, and the connection with universities in order to enhance the knowledge base related to mechatronics (Freddi 2009).

As a consequence to such a cluster formation the Emilia-Romagna region instituted in late Nineties the School of Mechatronics Engineering, in the same area where the cluster is located, in order to answer the specific needs of the local environment generated by the development of a new distinct body of knowledge (Dosi 1982). This work aims at investigating the effects that such higher education institution played on the innovative capabilities of firms that employed graduates in mechatronics, seeking to study the co-evolution between technological change and institutions.

In order to test our research questions we tracked the career of graduates in mechatronics from 2004 to 2012 that were employed in the local productive system. As the focus of the work concerns the dynamics of a particular setting and because our research questions are in the why and how form we employed a multiple case study research (Eisenhardt 1989, Yin 1994). We directly interviewed a group of firms that employed graduates in mechatronics and a group of firms that did not and explored the differences in the innovative capabilities developed by the firms due to such appointments. Literal and theoretical replication were assured (Yin 1994). We also made sure to triangulate our data by interviewing key individuals both of the productive and institutional sector (Yin 1994).

This work adds on the effectiveness of creating an ad hoc higher education institution in order to answer specific knowledge needs of a productive system. More specifically we investigate the positive effects such institution brought to the innovation capabilities of firms of the

system and the connected criticalities. That is, we seek to understand how and why firms of such system benefited from the creation of such institution, and which critical matters emerge in such a process.

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