



**Collaborative R&D in the Robot Technology in Japan: an Inquiry Based on
Patent Data Analysis (1991-2004)
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The growing trend of collaborative R&D has been well documented recently, both at a global level and through national and industry case studies. However, there is no general agreement on its causes as well as on the motives of the firms collaborating in R&D with other players. The Japanese innovation system (JIS) is no exception. Furthermore, in this case, it is particularly important, because the JIS has been described since the 1970s as dominated by "in-house" R&D by large firms and this feature has been considered as one reason of the limits that the JIS reached at the end of the 1980s.

By contrast to the existing literature on collaborative R&D in Japan, this paper focus on the case of the robot technology (RT), by using patent data applied in Japan between 1991 and 2004. The questions we address in this paper are as follows: Did the R&D collaboration in RT increase since the beginning of the 1990s? Did the R&D collaborations lead to higher quality of the outcomes? Is it possible to categorize different forms of collaborations and different types of players (depending on their degree of collaboration)? How to explain the evolution of R&D collaboration, if any?

Our results are as follows. First, the level of R&D collaboration in the RT in Japan is overall low and dominated by inter-firm collaborations; but it has increased between 1991 and 2004, especially in the case of collaboration between firms and universities. Second, R&D collaboration has apparently a positive impact on the quality of the patents, but should be more carefully investigated. Third, we find a significant heterogeneity across firms in the practices of collaborations (number of collaborations, choice of partners and "fidelity" with the partners). Fourth, these patterns are tentatively explained by the structural characteristics of the RT (by reference to a transaction cost argument and to the role of science-based technologies) and by firms' capabilities hypothesis; however, it is not possible to clearly identify if one theoretical hypothesis is better supported by the facts.