

Engineering Impact

Analyzing the Scientific and Technological Outcomes of Collaborative Research between Universities and Firms

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AKADEMISK AVHANDLING

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ABSTRACT

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This Ph.D. dissertation analyzes collaborative research between universities and firms in the field of electrical engineering in Sweden. It conceptualizes such collaborations as one form of academic engagement that fosters knowledge networks among individuals and organizations. It is essential to expand our understanding of this phenomenon as it holds significant implications for technological advances and economic progress.

The purpose is to analyze the impacts of collaborative research between universities and firms, as compared with the impacts of similar research conducted without firms. In doing so, this dissertation examines and selects among measures of impact, including both scientific and technological impacts, as well as variables that capture relevant dimensions of collaborative research.

By developing and utilizing a dataset based on employment records of faculty members from five leading Swedish (engineering) universities, this dissertation analyzes scholarly publications in the domains of biomedical, communication, control, and signal processing engineering. The analysis encompasses 8455 scholarly publications authored by 184 professors affiliated with Chalmers University of Technology, the Faculty of Engineering at Lund University, KTH Royal Institute of Technology, Linköping University, and Uppsala University.

The research reveals that 17.3% of the examined publications are defined as outcomes of prior academic engagement, showcasing an upward trend over the period from 2000 to 2018. These collaborative publications are associated with greater article and technological impacts than those of purely academic research, evidenced by higher citation counts in both scholarly literature and patents. However, they are also associated with a lower journal reputation, suggesting that these articles are less frequently published in high-impact journals.

Notably, dual-affiliated professors, constituting one type of boundary spanner between academia and industry, as well as a greater number of authors are associated with higher article impact. Moreover, publications with firms led by academics —i.e., those with a university-affiliated first author—are associated with high article and technological impacts, whereas those led by industry partners show a pronounced technological impact compared with purely academic projects. The influence these variables have on the journal reputation was found to be less pronounced.

This dissertation contributes to the literature on academic engagement, particularly in the engineering sciences, underscoring the benefits of integrating diverse knowledge from academia and industry for more impactful scientific and technological outputs. Additionally, the findings add to the discussion on academic success metrics, emphasizing the need for a balanced approach in which the real-world application of research is recognized alongside academic prestige, while being cautious of the pitfalls associated with overreliance on journal reputation alone.

These findings offer valuable insights for academic institutions, firms, and policymakers, specifically emphasizing the importance of fostering effective collaborations between individuals to combine academic and industrial expertise in engineering research. Future research directions include a deeper examination of the roles of industrial co-authors, dual-affiliated researchers, and lead authors in these collaborations, as well as broadening the scope beyond electrical engineering in Sweden to enhance the generalizability of the results.

Keywords: university-industry collaboration, academic engagement, collaborative research, knowledge networks, team size, boundary spanner, lead author, scientific impact, technological impact, bibliometrics, engineering.

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