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# MANAGEMENT

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*of Innovation and Technology*

## ACADEMIC PATENTING IN SWEDEN

– the hidden backbone of innovation

*by Evangelos Bourellos*



# Academic Patenting in Sweden

## – the hidden backbone of innovation

What is really the status of academic patenting in Sweden? Even though the importance of commercializing university research has been frequently discussed in and great efforts to increase patenting, licensing, and start-up creation have been made at many of our universities, surprisingly little is actually known about academic patenting in Sweden.

by Evangelos Bourellos

A contributing factor to this is that there are many difficulties when it comes to creating statistics on academic patenting. Statistics that capture this only at a superficial level have contributed to a misleading perception of poor academic output and also miss out the role of academics as invention producers and actors at the university-industry interface. In his PhD thesis, Evangelos Bourellos studied how knowledge is created and transferred from universities to industry. The PhD thesis is a compilation of four co-authored papers, two of which have been already published in international peer-reviewed journals.

### Academic Patenting in Sweden.

The predominant systems of calculating academic patent statistics defined academic patents as those where the university was listed as owner or inventor in the patent application. But as shown in many European countries there are many patents where academics are involved which are excluded from these statistics because these patents are not owned by the university. Therefore, academic patents are better defined as patents where at least an academic is listed as inventor. In Sweden the statistics change dramatically with this calculating system as Swedish academics still have the “professor’s privilege”, which means that individual university researchers own the intellectual property rights (IPR) generated in their research, unless something else has been agreed upon.

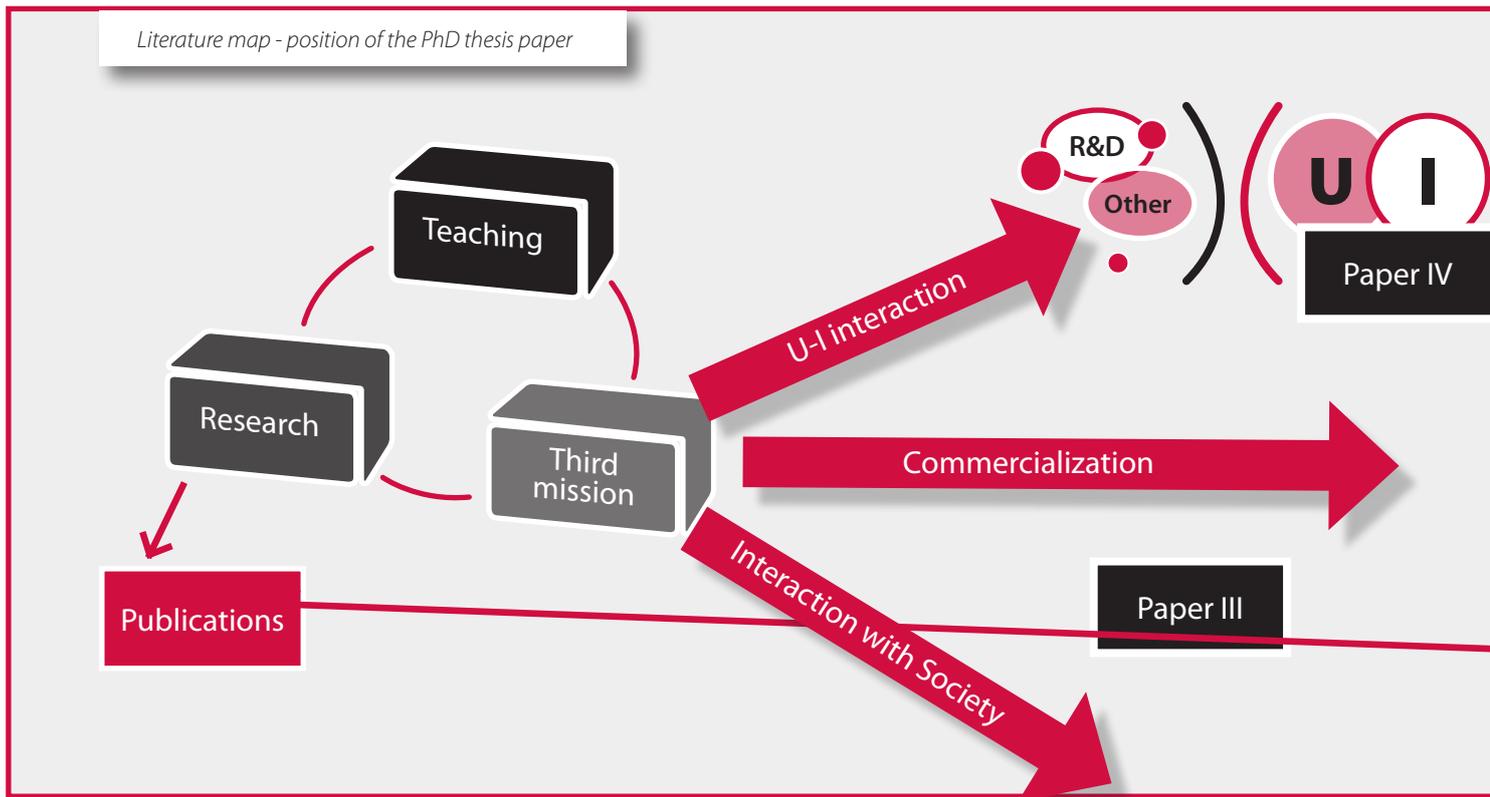
”*Academic patents as a fraction of all patents rise from 0,5% to c.a. 6% with the new calculation, a number comparable to other European countries and USA*”

In order to calculate academic patents in Sweden, Evangelos has created a database with all academic employees in Sweden, which was then matched with data from the European Patent Office (EPO). This work was performed as a part of the KEINS project, in which a comparison of academic patenting in several European countries was performed. The results, which are presented in a forthcoming book chapter co-authored with Maureen McKelvey and Olof Zaring, show a completely different output in terms of academic patents, as compared to the traditional system of calculating patents. As an example it can be mentioned that academic patents as the fraction of all Swedish patents increase from 0.5% to approximately 6% when using this new calculation, a number comparable to other European countries and the U.S. These results show that Sweden does not lack in terms of academic patents and entrepreneurial spirit, as has previously often been proposed. Academic patenting in Sweden is highly skewed in terms of disciplines and universities. High number of academic patents and inventors are found in electrical engineering and nanotechnology, while Lund and

Uppsala University are the universities with the highest amount of academic patents. The typical academic inventor is a male professor in his 50s, the gender gap is big, and most of academic patents are owned by firms.

### Research performance and commercialization.

The entrepreneurial spirit of academics is further confirmed by academics’ opinions in a survey within engineering and natural science. In a second paper of the thesis, co-authored with Mats Magnusson and Maureen McKelvey, the mechanisms that lead to academic entrepreneurship in terms of patents and start-up firms are examined. The factors analyzed in the econometric models included research performance, networks and university support structures. Research performance was measured by published peer-reviewed articles in scientific journals and funding from grants. Publishing is correlated with patents and start-ups supporting the argument that the highest performing researchers are also those who commercialize their research. The above results contribute to the discussion of whether



basic research is substituted by applied research by giving evidence from a country where around 80% of academic patents are owned by firms. Interestingly, the “star scientist” effect is nevertheless strong in Sweden. On the contrary, academics networking patterns was not found to be decisive for commercialization. On the one hand, it might be that commercialization of academic research receives mixed effects from networking as research it is a knowledge-intensive task which requires concentration and more “isolation”. On the other hand, there is evidence that people who have previously worked in industry have higher probability to commercialize their research. So, a preliminary hypothesis for future research could be that academic entrepreneurship can only benefit from specific and specialized networks. Last but not least, Technology transfer offices, incubators and courses on entrepreneurship

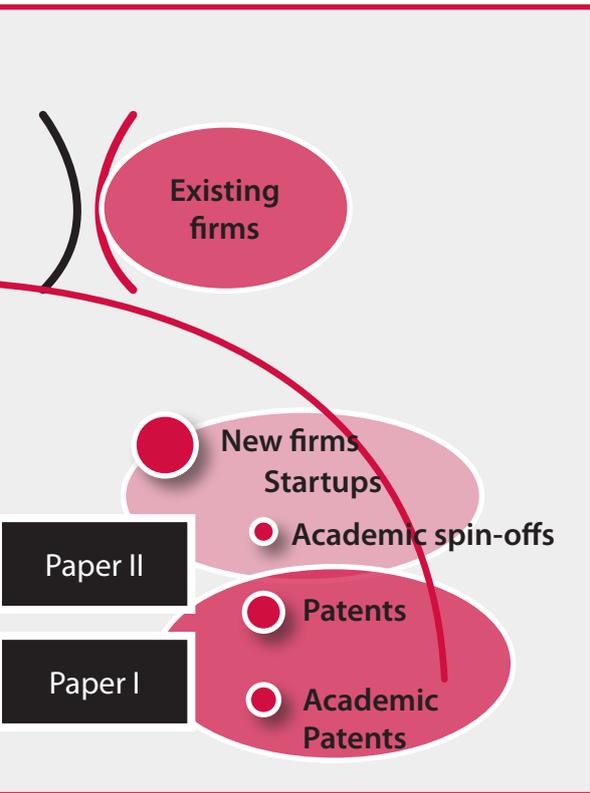
play an important role by facilitating the commercialization process.

#### **Nanoscience: When science meets technology and business innovation**

Given its knowledge-intensive nature, nanoscience is a field where academic patenting and entrepreneurship are particularly interesting. Nanoscience is a rapidly developing interdisciplinary field where Swedish academics present high performance in terms of science and technology output. In order to delineate the field and calculate descriptive statistics about nanoscience in Sweden, two databases, from two independent data sources, were employed in a study by Evangelos Bourellos, Berna Beyhan and Maureen McKelvey. Matching the two databases enabled the researchers to identify academic inventors who had been publishing in nanoscience. Then,

descriptive statistics on academic patenting and publishing within nanoscience in Sweden were presented. The results show that Sweden is a leading European country in terms of academic patents and publications in nanoscience. Around 80% of nanoscientists are located in five universities, and Lund University has the highest number. Most of the researchers active within nanoscience originally come from the field of chemical sciences. In terms of patent and publication productivity the results are again highly skewed, once again presenting strong evidence for the “star scientist” effect. In order to scrutinize the patenting-publishing dynamics two groups of “twin” academics were created. The first group consists of nanoscientists who patent and the other group with their twins who do not. Isolating the patenting-publishing variables from other factors reveals that academic patenting in

*”These results show that Sweden does not lack in terms of academic patents and consequently in entrepreneurial spirit as previously assumed. Sweden is a leading European country in terms of academic patents and publications in nanoscience”*



tents perform better in terms of citations in the long term. Patents belonging to the core technological profile of the firm had higher value both in the short-term and the long-term. However, when taking the specific field of technology into consideration, the observed differences tended to disappear.

To conclude, Evangelos's PhD thesis has shown that academic patenting in Sweden has been previously underestimated. Swedish academics patent substantially and when studying the mechanisms behind patenting as well as the university-industry links several interesting results emerge, which need to be utilized and further explored in the future. ●

**Research Focus:**

*Evangelos research is focused on innovation in academia, academic entrepreneurship and innovation policies. His PhD thesis combines analysis on patents, bibliometric analysis and network analysis as a part of the empirical analysis.*

*He was involved in the project "Academic Patenting in Europe" and he is responsible for the data collection regarding academic patents in Sweden. Furthermore, he has a focus on nanoscience in Swedish academia.*

nanoscience is highly correlated with the quality of publications.

**Academic inventors, technological profiles and patent value: What value do academics bring to firms?**

In Sweden, as already mentioned, the majority of academic patents are owned by firms. Academic involvement in industrial patents is a result and an indicator of the university-industry collaboration and the last part of Evangelos's PhD thesis focuses on the evaluation of this involvement in a paper together with Daniel Ljungberg and Maureen McKelvey. The underlying hypothesis is that when academics get involved in industrial patents, they bring with them an inclination towards basic research. Previous literature has provided evidence that academic patents have lower value, as measured in terms of forward patent citations. This paper suggests that academic patents' value is more illustratively assessed when two more dimensions are included, namely the separation in short-term and long-term value, and the distinction between core and non-core patents. Taking these aspects into consideration, academic patents were compared with non-academic patents in terms of value. The results indicated that academic pa-

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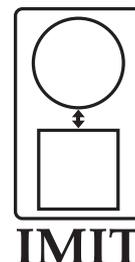
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