

The 2019 Technology Transfer Society Annual Conference

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Session 4.1 – Chair: David Wolfe

Location – CCF

Title: Maximizing innovation and technology commercialization of federal research investments through the best practices of innovation and economic prosperity universities

Authors: Paula Sorrell, Sarah Crane

Presenter: Sarah Crane

Abstract:

Research universities and Federal Research Labs (FRL) are the cornerstone of American innovation. The country's national competitiveness depends on these institutions to increasingly perform, translating research into the innovative products the country needs. However, technology commercialization is a nonlinear process and difficult to achieve efficiencies and address gaps. To address this, it is necessary to understand best practices for high-performing universities. This study investigates the best practices of 59 Innovation & Economic Prosperity (IEP) designated universities in technology commercialization. Among a sample of 110 public doctoral universities in the U.S. with detailed technology commercialization output data available between 2012 and 2016, those with the IEP designation produced a significantly higher mean volume of new disclosures, new patents, startups initiated, and exclusive licenses and options. This demonstrates the unique qualities of this study group with its intentional focus on economic development and innovation.

The study team performed a mixed method analysis to determine best practices. Qualitative data informed thematic groupings of the best practices, while quantitative survey data helped inform the validity of the finding. The study collected and analyzed primary, original data from 261 participants involved in technology commercialization:

- 51 interviews with IEP university faculty researchers,
- Ten interviews with affiliates of the federal research laboratories, and
- 200 surveys with IEP survey panel members, including Vice Presidents for Research, technology transfer staff and angel investors.

Results indicate four themes of best practices: culture, champions, incentives and collaboration. Universities with a strong cultural emphasis on lab-to-market promote its value both internally to the university, as well as externally to the surrounding community. Strong technology ecosystems are dependent upon champions - experienced professionals assisting in the maturation of a technology through expert guidance and mentorship. Incentives are vital to motivate and reward new ideas, while resources provide the necessary environment for continued growth. Finally, key collaborations are necessary throughout the process to foster ideas and to access resources throughout the ecosystem. These best practices form a foundation that can guide, grow, and evolve as IEP universities experiment and implement lab-to-market ideas.

Title: Project based determinants of academic entrepreneurship as result of proof-of-concept programs

Authors: Daniele Battaglia, Emilio Paolucci, Elisa Ughetto

Presenter: Daniele Battaglia

Abstract:

In this research, we study the effect that the interplay between internal characteristics of Research-Based Innovations (RBIs) and PoCs program have on the different forms of commercialization of research (e.g. licencing, spin offs).

One of the most relevant issues for university managers and policy makers is represented by the commercialization of RBIs developed by the academic faculty. In fact, according to Swamidass (2013), up to 75% of RBIs developed within universities are never licenced and commercialized. Several obstacles and inefficiencies have been identified by previous literature limiting the successful commercialization of RBIs. Among them, the most relevant are related with the lack of available resources to support Technology Transfer (TT; Munari *et al.*, 2016), information asymmetries (Siegel, Veugelers, and Wright, 2007), lack of management skills (Franklin, Wright, and Lockett, 2001) or communication. At the same time research and practitioners have been starting to seek for instruments alleviating commercialization problems. As the funding gap is perceived by public institutions as the most relevant problem (Rasmussen and Rice, 2012), principal instruments identified have been proof-of-concept programs (PoCs) and university seeds funds (Munari *et al.*, 2016). In this research, our focus is on PoCs. PoCs have been demonstrated by previous literature as a favourable instrument for TT since they enable the development of new university spinoffs (Hayter and Link, 2015) and help researchers to assess the commercial potential, to demonstrate the feasibility and value and to facilitate the definition of the strategic plan related with the technology (Kochenkova, Grimaldi, and Munari, 2016). At the same time past research noticed the high heterogeneity in the structure of PoCs offered among different universities in different countries, identifying critical design factors for their implementation (Munari, Sobrero, and Toschi, 2017).

Despite these advancements, literature has not deepened the specific relationship existing between the internal characteristics of RBIs, the PoCs and the commercialization. Internal characteristics (the characteristics of the team working on the RBI, as well its technological content and its development phase) are crucial factors for technology commercialization since they can limit or magnify the impact of PoC programs in relation with commercialization.

We study this issue on a sample of 31 projects developed at Politecnico di Torino and funded under the same PoC scheme between 2016 and 2017. To analyse the data, we employ a Qualitative Comparative Analysis (Ragin and Rihoux, 2009) and we investigate six attributes which are theoretically relevant for commercialization: the number, the age and the diversity of background of team members working in the same research group; the kind of technology and the degree of maturity underlying the RBI; the *ex-ante* intention of the team to set up a spin off.

The results stemming from the analyses highlight that for successful commercialization (e.g. the creation of a spin off) three requisites are strictly necessary: a high TRL, a previous intention of the team to set a spin off and an engineering-based RBI (instead of a science-based). If these conditions hold, spin offs may arise under four different configurations combining the age of the group, its dimension and the heterogeneity in their background.

These results provide indication to both practitioners and policy makers about the factors to be considered when policies for RBIs are designed. We also contribute to literature moving the attention from the external determinants of RBIs commercialization (as the design of funding instruments, like the PoC, Munari *et al.*, 2017) to the internal determinants of projects, as the team and technological characteristics of RBIs.

Title: International academic mobility and entrepreneurial knowledge: The moderator-mediator role of interpersonal networks

Authors: Kevin De Moortel, Thomas Crispeels, Jinyu Xie, Qiaosong Jing

Presenter: Kevin De Moortel

Abstract:

Globalization and internationalization drastically change the higher education sector in the 21st century (Knight, 2004; Audretsch, Lehmann, & Pleari, 2015). Academics increasingly move across international borders for educational, scientific, or commercial purposes (Rostan & Höhle, 2014; IOM, 2004). We refer to these movements as *international academic mobility*. At the same time, academics are increasingly challenged to engage in entrepreneurship next to their teaching and research duties (Davey, Rossano, & van der Sijde, 2016). Such engagement requires knowledge on how to start and operate a business including know-how on opportunity recognition or exploitation and on functional aspects of starting and running a business (Honig, 2004; Pretorius, Nieman & van Vuuren, 2005). We refer to this knowledge as *entrepreneurial knowledge*. Studies on how international academic mobility relates to academic entrepreneurship are scarce but add crucial insights to debates on career development, incentive systems, and university or government policies towards entrepreneurship (Wright, 2014). While scholars find support that international academic mobility stimulates academic entrepreneurship (e.g. Krabel, Siegel, & Slavtchev, 2012), we lack understanding on the relation between international academic mobility and the academics' receipt of entrepreneurial knowledge as a result of this mobility. We address this research gap and examine interpersonal networks as moderator and mediator of the relation between international academic mobility and the receipt of entrepreneurial knowledge. From a knowledge-based perspective, we theorize that an academic's international academic mobility and interpersonal networks allow to accumulate entrepreneurial knowledge. Interpersonal networks provide necessary knowledge to pursue certain career paths, like commercialization (Davidsson & Honig, 2003; Light & Gold, 2000; Shane & Cable, 2002) and international mobility serves as a way to augment the academic's interpersonal network which allows for the accumulation of additional multi-faceted knowledge that cannot be obtained otherwise (Edler, Fier, & Grimpe, 2011). As an empirical setting, China's current knowledge and innovation-driven economy increasingly relies on a high amount of international academic mobility, e.g. through CSC scholarships, the Graduate Students Joint Training program, and returnee professors, to drive academic entrepreneurship (Zhang et al., 2010). While Chinese academia is currently in a state of uncertainty towards embracing entrepreneurship, e.g. on incentives, university missions, and support systems, *guanxi*, i.e. interpersonal relationships, may form a safeguard in such uncertain environment (Fu, 2016; Liu, 2016; Xin & Pearce, 1996). A structural equation model for moderation and mediation is used to analyze the survey responses of a sample of Chinese academics.

Title: Academic engagement and performance-based governance: A re-assessment using experimental data

Authors: Anders Broström

Presenter: Anders Broström

Abstract:

University Faculty's outreach activities, also known as academic engagement, are considered an important channel for knowledge transfer between academia and its stakeholders. In deciding how, how much and when to engage in such tasks, individual faculty face inherent trade-offs between time and effort spent on academic engagement and on other tasks. Such decisions are therefore expected to be affected by the presence of performance-based governance – i.e. arrangement whereby the funding made available to individuals, departments and/or universities is being conditioned on performance in one or several dimensions. Schemes rewarding (a subset of) outreach activities may encourage researchers to increase efforts for academic engagement; at least for 'measurable' activities (Rossli & Rossi, 2016), and for junior faculty (Zhao et al., 2019). Correspondingly, increasing the pressure for publication output may shift individuals' priorities away from outreach activities.

However, there is very little research engaging directly with how individual behavior regarding academic engagement is affected by the mode of governance. In one of the very few studies to address this issue, Salter et al. (2017) report that respondents to a UK survey are (somewhat surprisingly) found to consistently prioritize impact over publication, even when impact is not of a type rewarded in the existing system for performance-based governance. This pattern is reported to hold for respondents of differing rank and status.

In this study, we re-assess the impact of performance-based governance on the prioritization of outreach activities by junior-level faculty. Specifically, three modes of governance are compared: 1) a situation where an individual's resources for research are conditioned on past individual performance; 2) a situation where an individual's department's resources for research are conditioned on past department performance; and 3) a situation where resources are not conditioned on past performance. We investigate both self-reported sensitivity to changes in the governance structure on prioritization of academic engagement (stated preference) and, using an experimental approach, estimated sensitivity to such changes (revealed preference). Data collection is at the time of writing on-going.