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International university-university technology transfer: Strategic management framework

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ABSTRACT

International technology transfer between universities is an emerging phenomenon and contributes to the socio-economic development of regions and countries. Technology transfer concerns transactions or long-term collaborations between acquirers and suppliers of technology. Based on strategic management theory, this study constructs a framework on the international technology transfer between universities. We theorize on the entry mode and pathway towards collaboration and apply the theoretical constructs to the cases of China and the Western economies, i.e., Europe and the US. By comparing the Chinese and Western perspective, we observe different entry modes and pathways of international university-university technology transfer. With regard to entry mode, the dominant Chinese perspective is to enter international technology transfer collaborations formally and with substantial resource commitments, while the dominant Western perspective suggests a more informal entry mode without the creation of a new entity. The Chinese pathway of international university-university collaborations on technology transfer is based on generating mutual confidence through formal arrangements and on replacing formal safeguards by informal arrangement as the collaboration matures, while the Western perspective suggests formalizing collaborations through a greater commitment of resources, which reduces managerial problems and allows collaborative learning.

1. Introduction

In addition to education and research, universities increasingly engage in technology transfer to contribute to the socio-economic development of their regions and countries (Guan et al., 2006; Perkmann et al., 2013). Technology transfer reflects transactions or long-term collaborations between acquirers and suppliers of technology (De Prato and Nepelski, 2014). In an academic setting, technology transfer occurs between firms, as acquirers, and universities, as suppliers of technologies. These collaborations are typically referred to as university-industry collaborations on technology transfer, and they play a vital role in fostering innovation (Etzkowitz, 2004; Hemais et al., 2005). By definition, innovation refers to the successful exploitation of new ideas. These ideas concern creating new or changing existing products, processes, organizational forms, and business models (Achi et al., 2016; Bessant and Tidd, 2015). We focus on the ensemble of parties who foster innovation and the interactions that appear as a consequence of these parties' common goal: the innovation system (Etzkowitz and Leydesdorff, 2000). Innovation systems are present on a local, regional, and national level but are increasingly internationally oriented (Heitor, 2015). Governmental and organizational initiatives in both developed

and emerging economies are devoted to the enhancement of the capabilities and efficiencies of these innovation systems (Fischer et al., 2017).

Within innovation systems, in addition to the traditional university-industry collaborations, *international university-university collaborations on technology transfer* (IUUTT) constitute an emerging form of technology transfer collaborations. In a flexible, global, and innovative business environment, going alone in technology development and its applications is too difficult to maintain (Inkpen, 1998a; Kim and Inkpen, 2005; Li, 2013). Therefore, to foster innovation, universities may access or acquire skills, technologies, and knowledge of their international partner universities, learn from their partners, create value in locations outside their home market, and enjoy diverse foreign economic policies (Hitt and Ireland, 2011; Kim and Inkpen, 2005).

Whereas a significant effort has been made to study university-industry collaborations on technology transfer, no such effort is made in an international university-university context. Given the emergence of IUUTT and to allow policy makers and practitioners to engage in IUUTT, we build a strategic management framework on international university-university collaborations on technology transfer, and we propose entry points and pathways of these collaborations. With regard to the

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framework, we first equate three IUUTT types to their strategic alliance equivalent and subsequently theorize the relationship between four key strategic management concepts and the different IUUTT types. Strategic alliances are fundamental instruments to transfer technologies across organizational boundaries and across countries (Inkpen, 1998a). We draw upon the knowledge-based view, as we consider these technologies, including the tacit and implicit knowledge related to these technologies, as the main resource of an organization to establish a competitive advantage (Grant and Baden-Fuller, 2004). We apply the accumulated knowledge on strategic alliances to a university-university setting to build our conceptual framework. With regard to the entry modes and pathways to IUUTT, we compare and contrast the Western, i.e., European and U.S., perspective with the Chinese perspective. Although a Western perspective on technology transfer is well documented, we lack insights into the Chinese perspective.

Given the specific cultural and organizational characteristics, there is a need to understand the dynamics behind collaborations with emerging markets (Culpan, 2009). Although China is the second largest economic power in the world, China still boasts significant economic growth, continues to open up its borders for international activities, and transforms itself from an imitation-based to an innovation-based country (Fisch et al., 2016). In developing countries, traditional technology transfer contributes to this growth by creating jobs and improving the quality of life (Larger, 2008). International university-university technology transfer creates similar advantages.

We find that different types of international university-university collaborations on technology transfer reflect the different strategic alliance equivalents. We find, based on existing literature and theoretical development, that different IUUTT entry points and pathways exist when comparing Western and Chinese perspectives. Drawing upon our findings, we (1) recommend flexibility to policy makers in allocating funding for innovative collaborative projects, (2) notify practitioners to recognize the apparent difference in Western and Chinese perspectives for their future engagement in IUUTT, and (3) stimulate researchers to validate the propositions made in this study.

2. Universities and technology transfer

2.1. International university-industry collaborations

University-industry collaborations on technology transfer are mainly defined by their processes and mechanisms of collaboration. The typical university-industry technology transfer process starts with a research result of the university scientist and ends with a license, on the intellectual property of that result, being transferred to a firm (Siegel

et al., 2003). In addition to patenting, start-up companies, i.e., university spin-offs, get attention as a mechanism of technology transfer (Wright et al., 2007). Literature initially focused on patenting and spin-off companies, as many governments emphasized these mechanisms because well-defined metrics on patenting and spin-off activities were easily available (D'Este and Patel, 2007; Siegel and Wright, 2015). More recently, scholars also focus on informal mechanisms of technology transfer, including collaborative research, contract research, and consulting (Perkmann et al., 2013).

University-industry collaborations on technology transfer are widely recognized as a means to develop innovative countries and take on an international character (Lundvall, 1992). In China, through international university-industry collaborations, foreign universities contribute to the innovative capabilities of Chinese industries (Jin et al., 2011). For example, Chinese companies learn new skills and competences by engaging in collaborative technological projects or they are able to explore new markets through their foreign partner university.

2.2. International university-university collaborations

Globalization and the interrelatedness of markets is considered a main driver to change the higher education sector and technology transfer is a means to get involved (Audretsch et al., 2015; Estorilio et al., 2017). On an international level, joint research projects, education, exchange programs and even competition have soared in the past years. The innovation engagements that universities pursue through their third mission of commercialization and technology transfer exceed the organizational and national level and increasingly gain a global character through increased numbers of international co-publications, cross-border patents, and human capital mobility (OECD, 2008). In their model, Jin et al. (2011) recognize the existence of international university-university collaboration on technology transfer, but they leave these collaborations out of the scope of their paper as they focus on international university-industry collaborations. In contrast, we focus on these international university-university collaborations on technology transfer.

2.3. University-university collaborations between China and Western economies

International joint research is a major route of international collaboration between universities, often resulting in joint publications. According to Web of Science (November 2016), China (7%) is the third largest global contributor to university publications, following the EU (35%) and the US (30%). Fig. 1 shows the rise in the share of

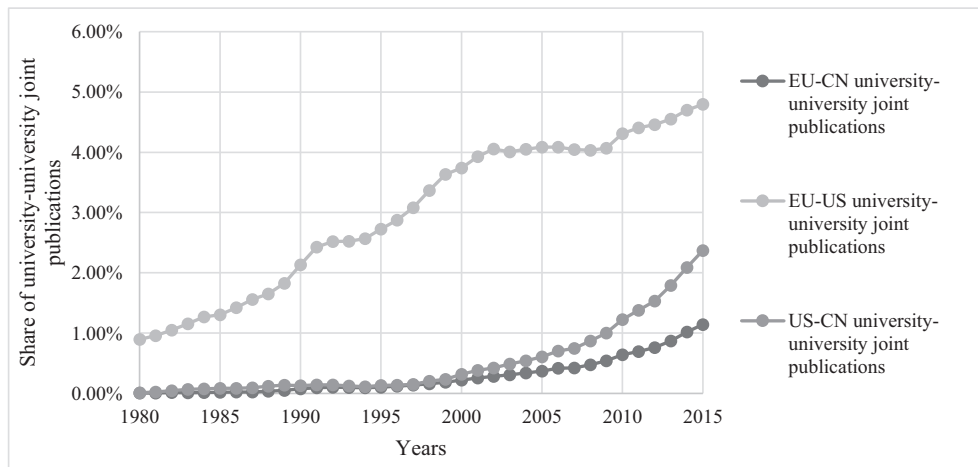


Fig. 1. The share of international university-university joint publications between 1980 and 2015. (Source: Web of Science, own set-up)

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