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University-industry innovation collaboration: Reconceptualization

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ABSTRACT

This study investigates university-industry (U-I) innovation collaboration and proposes a renewed and empirically tested conceptual approach to analyse it. The motivation for the research emerged from the realisation that the majority of studies on university-industry innovation collaboration on organisational level present limited verification of why some seemingly similar collaboration projects fail while others thrive. Therefore, we aimed for reconceptualization of the way university-industry collaboration is analysed by developing the respective approach that was empirically tested via multiple case-study research of 12 cases. The approach combines elements of the U-I collaboration literature with a model of interaction from semiotics and boundary-crossing ideas from organisation theory. The novelty of this approach lies in explaining the heterogeneity and variation of U-I collaboration on individual level. The interaction model from the semiotics enables distinct U-I collaboration patterns to emerge. In a two-dimensional model it becomes clear that choosing the appropriate partner for potentially successful collaboration means matching the levels of preconditions between partners. The main contribution of this study is twofold: an interdisciplinary approach for analysing U-I collaboration using a multiple case-study research design and the explanation of relevant preconditions – individual rather than institutional levels of motivation and absorptive capacity – as critical aspects that determine the likelihood of the success or failure of such collaboration.

1. Introduction

University-industry (U-I) collaboration is nowadays considered a relevant economic driver as universities harness specialised knowledge that is expected to contribute to the economic development of countries or regions. Knowledge and technology transfer between academia and industry is expected to spur innovation, as this kind of collaboration combines not only heterogeneous partners, but more importantly, heterogeneous knowledge. Due to this heterogeneity, partners concurrently face the need to cross different boundaries whereby, managing their boundaries is the central challenge for inter-organisational collaboration (Tsasis, 2009). Therefore, the boundary spanning and relevant social processes may open important aspects of U-I collaboration.

Governments are actively promoting the formation and development of U-I networking by designing and implementing innovation policies accordingly (Perkmann et al., 2013; Etzkowitz et al., 2000; Park and Leydesdorff, 2010; Giuliani and Arza, 2009; Tuunainen and Knuuttila, 2009; Charles, 2003). However our understanding of the underlying mechanisms of U-I interaction is still limited (Steinmo and Rasmussen, 2016; Villani et al., 2016) and this research gap motivated us to undertake the study.

Studies on U-I collaboration have identified different motives, perspectives and numerous hurdles (Siegel et al., 2003; Yusuf, 2008), and have focused on institutional barriers (Bruneel et al., 2010), cultural differences (Bjerregard, 2010; Bloedon and Stokes, 1994; Davenport et al., 1999), transaction costs (Sampson, 2004), facilitating factors like intermediaries or knowledge brokers (Villani et al., 2016; Alexander and Martin, 2013) and several other crucial aspects. This multi-faceted relationship has been portrayed in several frameworks like the triple helix model (Etzkowitz and Leydesdorff, 2000). U-I collaboration research has mostly employed macro and meso levels. Past investigations have also mainly focused on formal university knowledge and transfer mechanisms, for instance those that directly lead to patent, publication, license or royalty agreement or spin-offs (Chai and Shih, 2016; Berkovitz and Feldman, 2011; Bozeman, 2000; Feldman et al., 2002; Thursby and Thursby, 2002; Czarnitzki et al., 2012 via Grimpe and Hussinger, 2013). However, there is insufficient knowledge on several aspects that influence the collaboration process, for instance the management stage of U-I collaboration requires more attention (Morandi, 2013).

It has also been recognised that the process of working together is not well understood at the micro level (Rigby and Edler, 2005:786; Bjerregaard, 2009; Bjerregaard, 2010). We embarked on the research

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by admitting that scant attention has been given to U-I research at individual level, where the heterogeneity of individual preconditions between collaborating partners affect the collaboration process. Individual-level differences in academic researchers have been found to determine their willingness to commercialize their research findings (Würmseher, 2017; Kalar and Antoncic, 2015).

To propose a logic in this heterogeneity, we use an interplay of theories and develop a fresh approach for analysing U-I individual level collaboration. The approach is based on two strands of theory: semiotics and organisational theory. We test the hypothesis that the two undisputable antecedents of U-I innovation collaboration are motivation and absorptive capacity, by capitalising on the model of interaction proposed by recognised semiotic Lotman (2009) and complement it with boundary-crossing ideas from organisational theory (Santos and Eisenhardt, 2005; Rau et al., 2012). The semiotic interaction model allows us to uncover the variety of individual level relationships in U-I collaboration. Partners from very different domains (academia and business) are bound to face boundaries and choosing the appropriate crossing mechanisms is a constant underlying task for U-I innovation collaborators.

Innovation is recognised both as an outcome and a process, but as the unit of analysis is the innovation collaboration process, the stages of the organisational innovation process of initiation and implementation are applied (Glynn, 1996; Williams and McGuire, 2010; Van de Ven, 1986). These stages make it easier to follow the non-linearity of the approach. The necessity to differentiate between the two stages emerged from the iterative cycling process between the approach and the data in the case-study research. The initiation phase is relevant for understanding the motivation for entering into the collaboration, and implementation is analysed because then antecedents play key roles. Hence, the main purpose guiding our research is two-fold: 1) to present an interdisciplinary approach to analyse U-I innovation collaboration, and 2) to provide new insights into U-I innovation collaboration by testing the proposition of two underlying preconditions. The empirical dataset from 12 case studies includes two paired interviews from each collaborating partner: business practitioners and academic researchers in Estonia. Multiple case-study research design is applied.

This article provides contribution in that it draws attention to the heterogeneity in individual level aspects that tacitly affect the U-I collaboration. Furthermore, our analysis culminates in three distinct typologies of collaboration according to the levels of preconditions. The outcome has implication on policymaking and theory.

2. U-I innovation collaboration

Collaboration between business practitioners and academic researchers has been conceptualised as a higher-level process that encompasses many frequently studied constructs such as cooperation, teamwork and coordination (Bedwell et al., 2012). U-I collaboration has been characterised by “cultural divide” between partners in terms of goals, perspectives, motives and routines; therefore, such collaboration is highly multifaceted. The decision-making processes in collaboration are challenging (Bäck and Kohtamäki, 2015), and individual factors are bound to affect it. Amabile et al. (2001) have attributed three important features to the collaboration between academic researchers and business practitioners: 1) it involves people who are members of different professions (academia and business); 2) it is a collaboration between individuals or teams, not between organisations; and 3) the collaborators are not all members of the same organisation. The distinction of individuals and teams versus organisations is a relevant point of departure in this study, as the conceptual approach focuses on individuals and teams. Organisations create the context for the collaboration, while motivation and maturity for that depends rather on the specific characteristics of acting individuals and teams than on the general organisational processes.

Creativity and innovation literature suggests that useful new ideas can arise from the combination of very different viewpoints (Kirton, 1976; Senge, 1990). Therefore, we presume innovation to be the focal aim of U-I innovation collaboration. Partners from different domains work together in collaborative partnership using each other's resources to come up with innovative solutions. The underlying motivation for partners from different domains to start collaborating could be the expectation of innovative solutions, new knowledge, new conceptual approaches, new methods, inspiration and so on. Otherwise, a traditional, so-called off-the-self solution would be used, and there would be no need for innovation. In different definitions of innovation as early as Joseph Schumpeter in the 1930s, the common element is “new” where new can mean the creation of something entirely new as well as the diffusion of something that already exists. By definition every innovation is unique. For business practitioners, innovation is considered an important determinant to achieve competitive advantage (O’Regan et al., 2006). Therefore, in the majority of cases the business practitioner initiates innovation collaboration with an academic researcher and proposes a research problem that requires an innovative solution and new knowledge from outside the company.

Researchers have identified several factors affecting U-I innovation collaboration. Bruneel et al. (2010) have emphasised that the fundamentally different institutional norms in academia and industry hinder effective U-I collaboration the most. Research has also identified trust as a determinant mechanism to facilitate collaborative R & D projects (Bäck and Kohtamäki, 2015; Hemmert et al., 2014; Sherwood and Covin, 2008; Van de Ven and Ring, 2006; Dodgson, 1993; Uzzi, 1997). It has been identified that the related prior knowledge of partners reduces the risk of ineffective collaboration. With respect to bridging the barriers, organisational and managerial skills are critical (Collins and Wakoh, 2000). The help of a technology transfer officer might be useful in helping partners overcome barriers arising from their domain-specific differences. With respect to objective setting, case studies have concluded that in some cases the stakeholders have admitted being too ambitious in their expectations of what they could achieve in the time with the available resources (Barnes et al., 2002).

It has been suggested that partner evaluation prior to collaboration is necessary. For instance, Giuliani and Arza (2009) compared two wine industries in different regions, Italy and Chile, and concluded that the Chilean model of preferring selective formation of U-I linkages is more reasonable than the Italian model of not evaluating the partner prior to forming interactions. It has also been suggested that with respect to partner evaluation, evidence of previous collaborative experience and professional skills and the expertise the partner would contribute are also of significance (Barnes et al., 2002). We argue that the research gap in U-I collaboration literature lies in the limited understanding of implicit key factors that affect the collaboration process. Therefore, we propose an approach where the focus is on two key preconditions – motivation and absorptive capacity. We determine the levels of preconditions for both partners, and by analysing the extent by which they match between partners we explain the differences in collaboration patterns and in perceived performance.

The backbone of the article is an approach for analysing U-I collaboration based on ideas from two disciplines: the semiotic model of interaction from semiotics and the boundary-crossing concept from organisational theory. Combined they offer a renewed approach for studying U-I innovation collaboration, enabling fresh angles and outcomes to emerge that otherwise would not be as explicit. Semiotics focuses on understanding different semantic fields. The business domain and academia represent different semantic fields; therefore, semiotics equips us with appropriate instruments for analysing the situation where different semantic fields meet. University-industry collaboration is an institutionalised relationship, where partners represent the interests of their institutions; therefore, ideas from organisational theory are applied. In a collaboration partners need to cross organisational boundaries to proceed, but in doing so, relationships on the individual level become crucial. The approach, subsequently