



Efficient Triple Helix collaboration fostering local niche innovation projects – A case from Denmark



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ABSTRACT

Collaboration between universities and their local stakeholders is becoming a key success factor for the growth of regional entrepreneurial ecosystems. Efficient energy solutions are often facing challenges in innovation diffusion, which is in contrast to the growing demand for providing answers to key ecological problems. In order to present how an efficient Triple Helix collaboration could foster and support niche innovations, an applied research project is introduced. This unique university-industry-government cooperation brings a students' idea to a proof-of-concept project thus covers the entire innovation process. The selected case offers insights of how and why such initiative could emerge, as well as discusses its implications for future technological innovations and in particular those that are about to emerge in regional entrepreneurial ecosystems. Networking, win-win-situations as well as a strong problem orientation were identified as key success factors which may accelerate efficient future Triple Helix collaboration and cooperation for ensuring a higher innovation diffusion success.

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1. Introduction

Ecological problems call for new innovative solutions. One of the areas that have been attracting increasing attention is the supply of cooling and heating energy both in the domestic and industrial market. To date, fossil resources have been commonly used for heating, and electric energy for cooling. This is a major issue for instance in power plant cooling, as these processes need more than 50% of water withdrawals. It takes a hundred times less energy for treatment and supply of water than for heating water up to the point of use for consumers (UNESCO, 2014). Nevertheless, new energy efficient solutions often face a series of barriers in successful market diffusion (Ruby, 2015; Solberg Hjorth and Brem, 2016).

Policy makers emphasize the importance of innovation, entrepreneurship, and creative destruction, especially in the process of developing sustainable solutions that should solve key global challenges (Audretsch and Link, 2012). If companies will not be able to identify new developments early enough, policymakers may be forced to execute them through regulatory-push (Männer et al., 2012). One of the ways to avoid it is to further investigate collaborative business initiatives within the regional scheme that could successfully generate innovative products and services, which contribute to economic growth, and boost competitiveness in globally linked markets (Audretsch and Link, 2012).

New green product and service development as well as the entire process of sustainable transition (Trencher et al., 2013) need time and proper involvement of relevant stakeholders. That is why existing literature focused on Triple Helix collaboration informs us about the relationships between various potential innovation stakeholders (Etzkowitz, 2003a) and its connections to national innovation systems (Etzkowitz and Leydesdorff, 2000). Moreover the emerging topic of entrepreneurial university along with its possible new functions in co-creating sustainable transitions (Etzkowitz, 2003b; Franco and Haase, 2015; Trencher et al., 2013) and ecosystems considers mostly the large firms (Bosch-Sijtsema and Bosch, 2015; Rohrbeck et al., 2009) as the industry representatives thus leave the research gap in the scope of SMEs, startups and applied research projects.

In order to fill this gap our research explores how efficient Triple Helix collaboration could stimulate and support innovation diffusion in niche innovation projects. A unique case of an applied research initiative, called Green Water Research Project (GWRP), is analyzed through a combination of autoethnography (Ellis et al., 2011; Wall, 2006) and case study analysis (Eisenhardt, 1989; Yin, 2009). This case study shows how a university-industry-government cooperation brings a students' idea to a proof-of-concept project. A special attention is given to the role of the entrepreneurial university (Etzkowitz, 2003b). In this, balanced Triple Helix configuration, university acts in partnership with (local) industry and government (Etzkowitz and Leydesdorff, 2000), to create a favorable environment for eco-friendly technological innovation. These three actors are not only part of the same socio-technical regime, but also strongly support niche innovation projects present in

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Southern Danish regional entrepreneurial ecosystem (Autio et al., 2014; Geels and Schot, 2007).

The case of GWRP offers insights on how and why such initiative could emerge, as well as discusses its implications for future technological innovations and in particular those which are about to emerge in a regional entrepreneurial ecosystem. Our work contributes to the theory of socio-technical system by analyzing a regional entrepreneurial ecosystem through Triple Helix lens as well as to practice by serving as guidelines for all Triple Helix stakeholders already involved or with interest in establishing and developing niche innovation projects. The generalization boundary conditions are set by regional entrepreneurial ecosystems.

In order to provide the best overview over the case and its analysis, the paper starts with a description of the theoretical context of the study. Afterwards we describe the methodology and present the case study and key research findings which are further analyzed and discussed in the following sections.

2. Theoretical context

2.1. Triple Helix approach

The Triple Helix collaboration concept (Etzkowitz and Klofsten, 2005; Etzkowitz and Leydesdorff, 2000) and its benefits are being commonly discussed within the frames of innovation systems (Lundvall, 1992). Politicians and local governments attempt to support regional development, by stimulating collaboration between various social actors. These actors mainly consist of local firms, universities, and governmental institutions, and their core supporting function is to focus on enhancing innovation related activities. Therefore, the Triple Helix approach aims to help scholars to better understand the dynamics of relationships between universities and their environments, which has been evolving from earlier narrow views on either the state or the firm having the leading role (Etzkowitz and Leydesdorff, 2000). Hence, the concept brings public and private actors together through cooperation expressed in joint resources, priorities and solutions (Etzkowitz and Leydesdorff, 2000; Lundberg, 2013).

Often, the Triple Helix concept analysis is limited to the policy level and offer relatively few practical recommendations for companies who want to build efficient relationships. In this context, Hung and Whittington (2011) introduced the concept of brokers who may play an important role in both facilitating networking processes between existing organizations as well as contributing to the development of new organizational forms. Hence, Lundberg (2013) calls for the necessity of such actors to put into practice: “Boundary-spanning actors who know many other network actors can bridge such gaps by transferring and adapting information and by adjusting the framing to different institutional logics” (p. 219).

Such ‘bridgemakers’ (Audretsch and Link, 2012) shall serve as connection makers between networks and institutions, as well as within them, thus fulfilling the fundamental purposes of Schumpeter’s work: innovation, entrepreneurship, and creative destruction (Audretsch and Link, 2012). This type of brokerage is an important tool that could be used by policymakers in response to the globalization challenges – especially concerning sustainability issues. Public policy would then focus on assuring good environment for entrepreneurial startups and generating new innovations that could, in a long run substantially contribute to economic growth, and boost competitiveness (Audretsch and Link, 2012). Even though the role of the policymakers in these innovation generating activities is widely acknowledged and has been discussed by innovation systems’ literature (Lundvall, 1992), there are still unanswered questions related to the way and particular activities that the other Triple Helix stakeholders could engage and help. Such practical guidelines and recommendations would be particularly useful for startups and niche innovation projects in order to assure efficient collaboration in their Triple Helix network (Etzkowitz, 2003b).

2.2. Multilevel and entrepreneurial ecosystem perspectives

Triple Helix concept supplies us with the knowledge of three social actors thus does not offer a holistic perspective over the entire entrepreneurial ecosystem connections. Since, innovation (understood as not only a novel, but also a commercialized solution) is a central point of this investigation, conceptual framing of a combination of socio-technical system and entrepreneurial ecosystem have been adopted. The main assumption of socio-technical system is that markets and users are not simply “out there” (Geels, 2004; Ruby, 2015). This argument becomes even stronger in an environmental innovation context: green innovations are highly dependent on co-development of innovation in networks with external resources, as well as on the acquisition of externally developed key resources (Cainelli et al., 2015).

The concept of the entrepreneurial ecosystem helps us to explain all the missing links and connections between the Triple Helix actors and the entrepreneurial activities related both to the university, as well as the niche innovation project. Geels and Kemp (2007) define the socio-technical system as a construct created by a group of elements involving: “technology, science, regulation, user practices, markets, cultural meaning, infrastructure, production and supply networks” (Geels and Kemp, 2007). These elements are generated, maintained and treated by the supply and demand side actors (Geels and Kemp, 2007). The first group consists of companies, universities, research institutions as well as policy makers and the second one covers a wide range of customers, users and other interest groups (Geels and Kemp, 2007). This can be identified as ecosystem components, which also combines the supply and demand side actors.

The Triple Helix configuration of actors is also present on the multi-level perspective (MLP) (Geels and Schot, 2007), which consists of three heuristic levels called niche innovations, socio-technical regimes and socio-technical landscapes (Geels, 2002; Rip, 1998) (see Fig. 1). These could be subsequently compared to the space where the innovation emerges, the set of institutions and rules which set the ecosystem boundaries as well as, an ecosystem’s business environment. Successful interaction between the ecosystem members emerges at the intersection of national culture and both political and legal system and entrepreneurial cognition (Nambisan and Baron, 2013).

Socio-technical landscapes, which form “an exogenous environment beyond the direct influence of niche and regime actors (macro-economics, deep cultural patterns, macro-political developments)” (Geels and Schot, 2007 p. 2) could be perceived as a business environment of an ecosystem which is exposed to influence from the government and other policy makers. A landscape conceptually resembles the entrepreneurial ecosystem due to its strong acknowledgment of the role played by the government and its leaders, which impact could go beyond direct influence (Geels and Schot, 2007). Nurturing and sustaining entrepreneurial activities as well as providing direct or indirect support (Isenberg, 2010) is allocated on the landscape level.

The Triple Helix actors are primarily part of the existing regime. Socio-technical regimes are combining institutions as well as the rules that are present in a technology driven ecosystem. According to Geels and Schot (2007 p. 2) this regime “accommodates this broader community of social groups and their alignment of activities”. This could be particularly visible in regional entrepreneurial ecosystems, which consist of interdependent actors located in close geographic proximity that co-evolve together and share (economic) interest. Nevertheless, in case of inter-organizational and in particular inter-firm relationships the sense of belonging to the community could be reflected in interdependencies between ecosystem members.

Niche innovations consist of the space where the innovation emerges and where both entrepreneurs and entrepreneurial teams (Autio et al., 2014) try to change the dominant design and adjust the existing regime. These niche innovations or technological niches are “carried and developed by small networks of dedicated actors, often outsiders or fringe actors” (Geels and Schot, 2007 p. 2). They exhibit a

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