

## Paper Session

# [A09] Entrepreneurial networks and the sustainability and growth of early stage clean-tech start-ups

Chris Eveleens [Netherlands]<sup>1</sup>, Frank Van Rijnsoever [Netherlands]<sup>1</sup>, Marko Hekkert [Netherlands]<sup>1</sup>

Utrecht University<sup>1</sup>

In sustainable transition, entrepreneurs play an important role (Geels et al., 2016; Hekkert et al., 2007). As new entrants, they experiment with new technological possibilities, develop new business models, and in the process they change institutions. As such, entrepreneurial activities contribute to applied knowledge development. In addition, entrepreneurial activities can demonstrate the potential of sustainable innovations, which contributes to the legitimacy of transitions (Suurs et al., 2010).

However, from the entrepreneurship literature we know that the start-ups often fail (Westhead and Storey, 1997). An important reason for this is their lack of resources and knowledge. To mitigate this lack of resources, entrepreneurs can leverage their social network (Brüderl and Preisendörfer, 1998). While previous studies explore the relationship between the network and performance, the network is a multifaceted concept and it is largely unknown how various dimensions of the network influence the performance of start-ups. Therefore, we study the influence of entrepreneurial network on clean-tech start-up performance. We focus on the early stage of start-ups, in which the role of social networks is important but little understood (Hite and Hesterly, 2001).

We follow Boschma (2005) for informing our dimensions of the social network, distinguishing cognitive, organizational, social, institutional and geographical proximity in the relationships of the social network. Cognitive proximity is based on the similarity of skills, organisational proximity is based on being part of the same organisation, social proximity is based on being part of the same social groups, institutional proximity is based on the similarity of organisations type, and geographical proximity is based on the physical distance. As there are advantages associated with both high and low levels of proximity (Boschma and Martin, 2010), we expect curvilinear relationships between the different proximity dimensions and start-up performance.

We adopt a quantitative approach based on the analysis of the social network of the entrepreneur. Our sample consists of 92 early stage clean-tech start-ups that are participating in a large scale European incubation programme. From the public directory of LinkedIn, we extract information on all the members of the social network from our entrepreneurs, from which we compose our proximity variables. Performance data comes from a yearly telephone survey on the number of people working at the start-up. We measure the performance in terms of number of people working for the start-up and the anticipated mitigated CO2 emissions.

We combine three different quantitative approaches to explore our hypotheses. First we count the high and low proximity relationships for each entrepreneur and relate these numbers to the performance of the startup. Second, we treat all the entrepreneurial relationships as independent measurements and use cluster-robust standard errors to fix the independent observations assumption (Cameron and Miller, 2015). Third, a macro-micro multi-level model is estimated in which the startup represents the high level and the relationships represent the low level (Croon and Veldhoven, 2007).

Preliminary results show a curvilinear u-shaped relationship between the geographical and social proximity of the relationships in the entrepreneurs' network and start-up performance. This suggests that clean-tech entrepreneurs need a mix of proximate and distant relationships along these two dimensions.

In order for entrepreneurs to play their important role in sustainable transitions, they require the right networks. The results show that these networks should not solely focus on proximity, which is typically the result of creating dense local networks and technology niches. We advocate that entrepreneurs need to complement these proximate networks with distant relationship to maximise the potential of clean-tech start-ups.