

Young and smart, how university spin-offs in Northwest Europe may contribute to sustainability transitions in energy systems

Many high-tech start-ups, including young spin-off firms at universities, are involved in developing new solutions in sustainable energy. To what extent and how these spin-offs reach market introduction of their invention and upscaling, is not well-understood. In general, transitions in socio-technical systems are difficult to bring about because of strong connectedness of system components, including technical and social ones, the last including vested interests. University spin-offs may differ in entrepreneurial orientation, mainly in risk-taking, in competences and in taking advantage from opportunities in the ecosystem. Due to such differences among spin-off firms, views on their ability to contribute to transitional change in energy systems are contradictory: on one side young spin-offs are seen as vulnerable to ‘liability of newness’, while on the other side young spin-offs are seen as benefiting from newness and from challenges beyond traditional horizons.

To increase understanding, this paper explores differences in market-introduction and scaling-up. It draws on a carefully selected sample of almost 40 university spin-offs and five case-studies in Northwest Europe, and applies rough-set analysis and in-depth case analysis to reveal trends. First, the paper introduces the multilevel perspective on socio-technical transitions and suggests where young spin-off firms may connect, most probably as part of consortia. Next, a preliminary research framework is designed derived from ‘micro-foundations’ of young spin-offs firms. This framework is then explored using rough-set analysis, a non-parametric ‘learning’ tool that is able to classify different spin-off firms given particular causal relationships. The results suggest a high probability of quick market introduction if the spin-offs are established in an ‘Innovation Leader’ country (like Sweden and Denmark) and combine this with building multiple networks to access resources and create market opportunities. A second set of favourable conditions include a practical mind-set through founders’ education merely at MSc level and accessing of substantial investment capital. In contrast, market introduction tends to be hampered if the spin-offs are engaged in solar energy technology as a follower, while employing relatively one-sided networks. Additionally, the detailed case study results point to unforeseen barriers from regulation in specific markets and from accessing investment capital without attention to sufficient pay-back time. The previous trends are compared with results from a study on university spin-offs involved in new solutions in healthcare, and their reaching the market. An analysis of communalities and differences in these distinct systems provides ground for formulation of policy implications. Apart from the country (NIS) and the energy system involved, policy implications are given for building of differentiated networks by young spin-offs, for developing a practical orientation, such as in participation in test beds and living labs to deal with regulatory issues, and for negotiation with investors on customized investment agreements.