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A Sectoral Perspective on Technological Innovation Systems – Patterns of Knowledge Development and Diffusion in the Lithium-ion Battery Technology

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Abstract

Technological innovation systems (TISs) have become a favored approach for the analysis of single technology's innovation dynamics. Complementary to TIS, other innovation system approaches like national, regional, and sectoral innovation systems focus on geographical and sectoral dimensions of innovation. This paper shows a first approach that explicitly integrates the sectoral dimension into TIS analysis, which seems especially relevant for multi-component technologies since they are produced in different sectors. To this end, we aim at elaborating on TIS functional dynamics with regard to the sectoral dimension. We exemplarily apply

this conceptualization to the knowledge development and diffusion function. We investigate the lithium-ion battery technology as it encompasses multiple components and has evolved from an immature to a dominant technology over the last 30 years. Based on a descriptive quantitative analysis of patent data in Japan (1985-2005), we identify knowledge patterns within and across the sectors involved. We find that different sectors play different roles for knowledge development and diffusion, also with regard to the technology life cycle. Thus, this study contributes in three ways. First, our results strongly suggest to include the sectoral dimension into the TIS conceptualization and future TIS analyses since this serves a better understanding of functional mechanisms as well as the ability to derive enhanced TIS based policy recommendations. Second, we identify specific knowledge patterns within and across different sectors in the lithium-ion battery technology. Third, we suggest a new methodological approach for investigating the sectoral dimension in TIS functions.

Please contact the author for further information!