

Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study

Paper presented at Nelson and Winter Conference, June 12-15, 2001, Aalborg, Denmark, organised by DRUID (Danish Research Unit for Industrial Dynamics), Research Policy and Corporate and Industrial Change.

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Abstract

This paper addresses the following questions: How do technological transitions (TT) come about? Can we distinguish particular patterns and mechanisms in transition processes? TT are defined as major technological changes in the way societal functions are fulfilled. TT do not only involve changes in technology, but also changes in user practices, regulation, industrial networks (supply, production, distribution), infrastructure, and symbolic meaning or culture. To answer the questions, this paper practices 'appreciative theory' (Nelson and Winter, 1982) and brings together insights from sociology of technology, evolutionary economics, and innovation studies. This results in an evolutionary perspective on TT where reconfiguration processes are important. The dynamics of these reconfiguration processes are conceptualised by distinguishing three analytical levels: i) technological niches, where variation is generated, ii) sociotechnical regimes, which represent a 'deep structure' and account for stability, iii) a sociotechnical landscape, representing the wider context and 'longue duree'. TT occur as the outcome of linkages and interactions of developments at multiple levels. The perspective on TT is empirically illustrated with a longitudinal qualitative case-study, the transition from sailing ships to steamships, 1780-1900. Three particular mechanisms in TT are derived from the case-study: niche-cumulation, technological add-on and hybridisation, riding along with market growth.

Keywords: Technological transitions, sociotechnical regimes, co-evolution, multiple levels, steamships

Note. If thought necessary for publication, I am willing to look for possibilities to shorten the paper.