A Silent Revolution


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Abstract

Currently, more than half of all Swedish single-family houses have an installed heat pump and more heat is supplied by heat pumps in Sweden than in any other nation. Despite the enormous impact of heat pumps on the Swedish energy system, the transition towards their use has gone relatively unnoticed. Hence the title of this thesis, ‘A silent revolution’.

This thesis provides an in-depth study of the Swedish transition towards heat pumps and how Swedish industries contributed to it. It approaches the topic from the perspective of value networks and ‘coopetition’, combined with the concept of complementarities. This approach has been inspired by the work of Verna Allee (2009) and Erik Dahmen (1991). In this thesis, value networks are networks of actors surrounding a specific business model, coopetition is used to describe the relationships between actors (as both competitive and cooperative), and the concept of complementarities is used to analyze the dynamics between synergistic elements and value networks in Sweden’s heat pump sector and energy system.

Based on this approach, the thesis explains how a durable web of relations and interdependencies between complementarities has developed within the heat pump sector and the energy system in Sweden, and between the two, during the country’s transition to widespread use of heat pumps.

Interest in heat pumps arose in Sweden and other parts of Europe during the 1970s. The Swedish energy system had been caught between international oil crises and national political mobilisation against nuclear power expansion. In this period of negative transformation pressure, the heat pump appeared as a promising alternative that could mitigate the use of oil and electricity for heating. In the 1970s, an early Swedish heat pump industry formed together with a growing heat pump market. A large number of diverse actors became involved in the Swedish heat pump sector, and the intense coopetition dynamics relating to heat pumps following the 1970s oil crisis contributed to durable connections between complementarities during the early stages of the transition.

The 1980s saw a rapid expansion of large heat pumps in Swedish district heating facilities. In the mid-1980s, however, oil prices dropped back to their previous low levels. This change, combined with other factors, such as lifted subsidies and higher interest rates, created a crisis for Swedish heat pump industry. The industry underwent a 10-year period of low sales of small heat pumps and the market for large heat pumps died out and never returned. Nevertheless, several connections between heat pump–related complementarities remained in Sweden after the mid-1980s. In conjunction with value network reconfigurations, changes in company ownerships and governmental industry support, these complementarities helped the Swedish heat pump sector to maintain both production and service capacity.
Due to developments that took place largely outside the heat pump manufacturing sector, by the mid-1990s it became possible for the struggling Swedish industry to offer more reliable and standardised heat pumps to the Swedish home heating market. During the years after 1995, the Swedish heat pump market grew to become the biggest in Europe. The industry's early development and growth gave Swedish companies a comparative advantage over its European competitors, with the result that the manufacturing of heat pumps remained concentrated to Swedish-based manufacturing facilities even after the Swedish heat pump industry became internationalised after 2005. As of 2015, Sweden had the greatest amount of heat production from heat pumps per capita of any European nation, and many heat pump markets in other European countries are 10 to 20 years behind the Swedish market in development.

This thesis shows how the Swedish heat pump industry has co-evolved with the market and how developments in the industry contributed towards causing the transition to heat pumps to occur so early in Sweden relative to other European markets. It also shows that coopetition dynamics in a socio-technical transition change with the emergence and characteristics of structural tensions between complementarities, which has implications for the strategic management of external relations and partnerships during socio-technical transitions. It further argues that the combination of the value network, coopetition, and complementarity concepts can be conceptualised for descriptive and exploratory studies on the role of firms and industries in socio-technical transitions, thereby offering a complement to existing dominant frameworks in the area of transition studies.

**Key Words**

heat pumps, socio-technical transition, sustainability transition, industrial dynamics, value networks, coopetition, complementarities, strategic management