Energy transition studies, TIS challenges and micro-meso considerations

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Goal presentation

- Start of large research project

1. Pitch theoretical issues / problems
   - Hope this project may contribute to solving this issues

2. Draw attention to micro level studies in relation to ET / innovation systems

Strengths of TIS analysis for ET

- Frequent consulting for governments
- Dutch ministry of Economic Affairs, Agency NL, Ministry of Agriculture, water sector, etc.
- Always use TIS analysis:
  - Structural analysis
  - Functional analysis
  - **We end with highlighting systemic problems / failures + recommendation to fix them. Motors of innovation.**
  - **Very strong analytical tool**

Structure TIS

- Organizations / actors
  - Industry, education, science & research, demand, government, intermediary, others (NGO, etc)
- Networks
- Institutions

- Technology
- (resources)

Key processes / functions of TIS

1. Entrepreneurial experiments,
2. knowledge development
3. Knowledge exchange,
4. guidance of the search,
5. resources mobilisation,
6. market formation,
7. counteract resistance to change

Criticism in scientific community

- Functionalistic (sociology)
- Unclear actor model
- Different lists of functions
- Different takes on functions related to development phase
- Different views on system elements / components
- Different views on system boundaries

- Partly justified: we underestimated language, conceptual rigor needs improvement, emergent community with slightly different ideas
- Also unjustified: very narrow-minded way of reading and interpreting

- We will need to correct this. I hope also this project can contribute.

More work to do: coupling of literature

- Functional analysis + inducement and blocking mechanisms (e.g. bergek, Jacobsson)
- Systemic failures (e.g., Smith, klein woolthuis)
- Systemic instruments (Smits, Kuhlman)

- Unfortunately: no perfect fit
- New paper by Anna Wieczorek in SPP we try to bring them together.

OECD 1997	Smith 2000	Jacobsson & Johnson 2000	Klein-Woolthuis et al 2005	Chaminade & Edquist 2007	Foxon & Pearson 2007	Mierlo et al 2010	Weber & Rohracher 2011
		Market failures: poorly articulated demand, economies of scale			2 market failures: Copy Knowledge Negative Externalities	Market structure	
	Failures in infrastructural provision & investment		Infrastructural failures	Infrastructure provision & investment problems		Infrastructure (Physical & knowledge)	Failures in infrastructural provision & investment
	Transition failures			Transition problems			Adaptation failures
	Lock-in failures	Local search processes		Lock in problems			Lock-in failures
Mismatch between basic & applied research, Malfunctioning of the technology transfer institutions	Institutional failures	Legislative failures	Hard institutional failures	Institutional problems (hard & soft)		Institutional (hard)	Institutional failures
		Failures in educational system	Soft institutional failures			Institutional (soft)	
		Wrong guidance for future markets	Interaction failures: - Strong network failures	Network problems / Unbalanced exploration-exploitation mechanisms		Interaction (too strong)	
Lack of interaction between actors		Poor connectivity	Interaction failures - Weak network failures	Complimentarity problems		Interaction (too weak)	
Information & absorptive deficiencies of enterprises			Capabilities' failure	Capability & learning problems		Capacities	
							Directional
							Demand articulation

Micro - meso

- Usual focus on system level
- 4 PhD students on micro level
  - Entrepreneurial strategies
  - Incumbent strategies
- Much attention for power and agency
- Battle over resources and institutions

- Entrepreneurs
  - Institutional change (regulative, cultural-cognitive, normative):
  - Collective vs individual strategies
    - Theory (running in packs) vs empirical observations
  - First, framing and legitimation strategies, formal institutional change follows
  - Institutional entrepreneur vs Institutional work (lawrence and suddaby)

- Incumbents
  - Reproduce existing institutions
    - The future will be sustainable energy but for the next 30 years it will be fossil fuel based – legitimacy
    - Increasing importance fossil energy system (gas roundabouts)
  - Defensive behavior
    - Lobbying against formal institutional change – carbon taxes, automotive efficiency standards
    - Standard committees
    - Delaying and relabeling practices within energy transition bodies
    - Acquisition of entrepreneurs
    - Defensive patenting
    - Shift to supportive behavior under certain conditions

- Due to system level focus, detail of analysis is always limited
- Specific micro level studies add insights to systems studies; deeper understanding of systemic failures

Suggestions for research

- Bear in mind conceptual discussions about TIS framework - positive contribution is highly valued
- Focus attention to both micro and systems level