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**Technology push or market pull –
success factors for the penetration of
decentralized and smart grids**

Technology push or market pull. Why we ask this question.

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Classical micro-economics:



good in modelling market stability

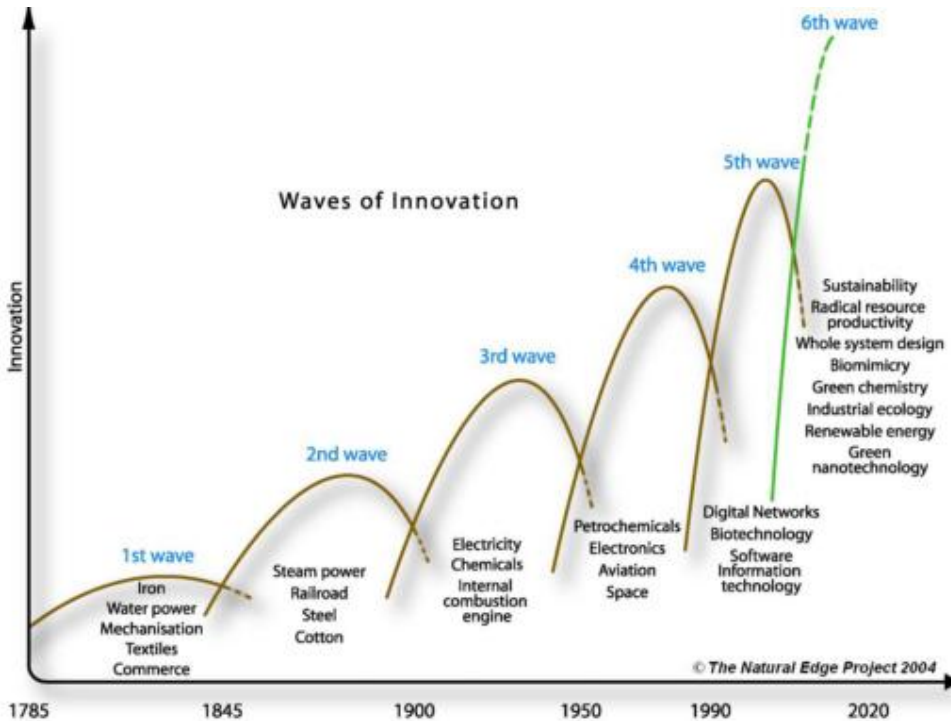


bad in explaining market success chances for new solutions

Technology push. The Schumpeter School.¹

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The entrepreneur drives innovation.



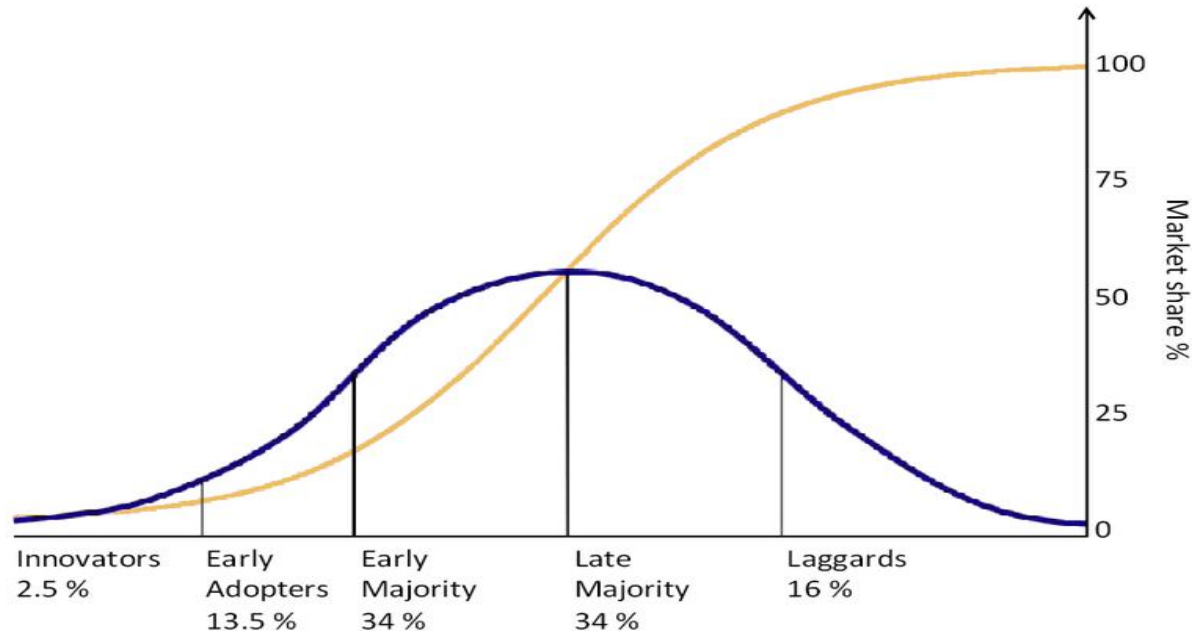
Kondratieff Cycles

The main factor is the technological opportunity.

¹ Schumpeter, Joseph (1997/1911). Theorie der wirtschaftlichen Entwicklung. Berlin: Duncker & Humboldt.

Market pull. The diffusion theory.

Rogers (1962)¹ has developed a pattern that shows how user need drives innovation.

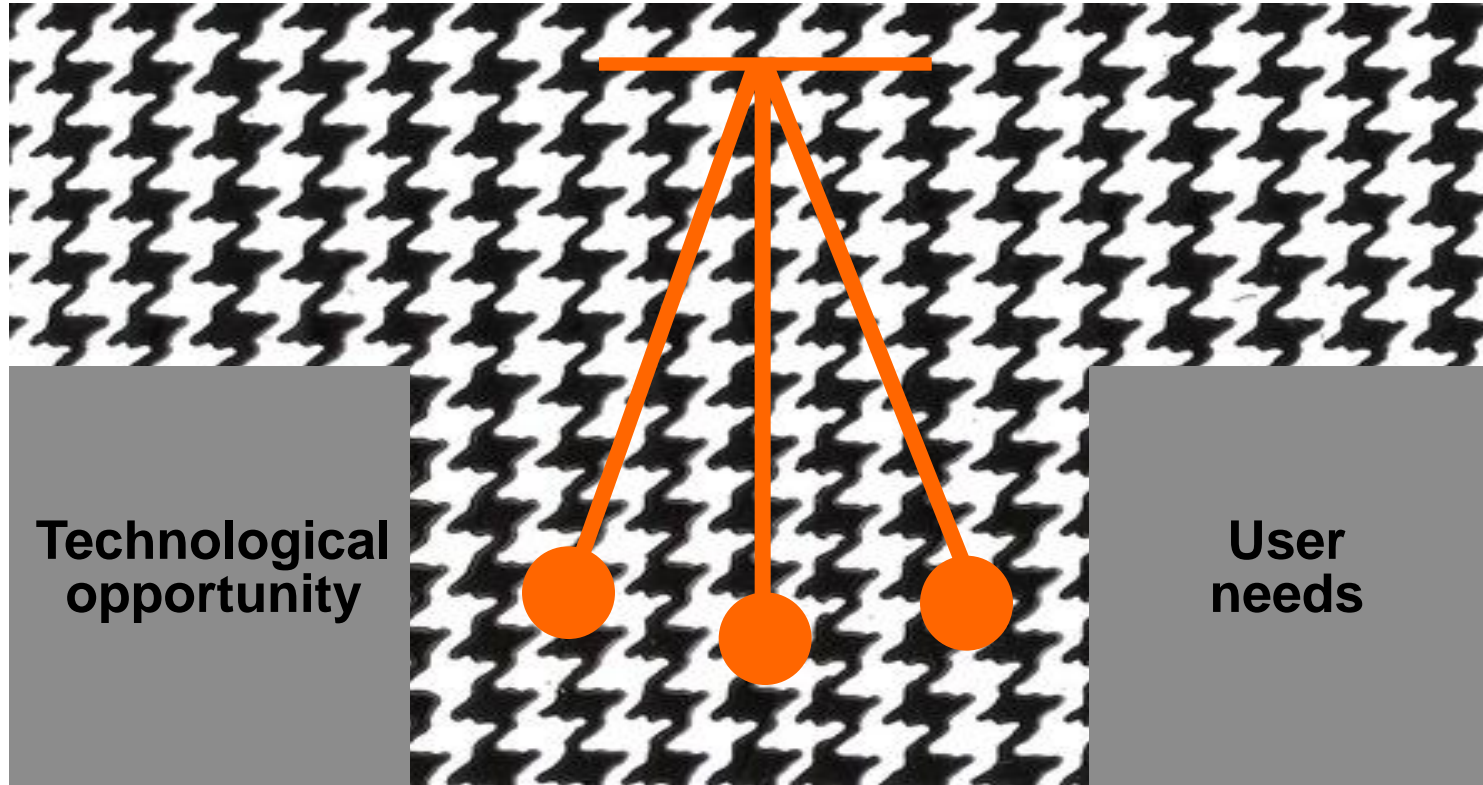


Main driver: inherent characteristics perceived by ist users.

¹ Rogers, Everett M. (1962). Diffusion of Innovations. Glencoe: Free Press

Technology push or market pull. What empirics tells...¹

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But maybe there is a bigger pattern behind...

¹ see for an overview: Astebro, Thomas & Dahlin, Kristin (2005). Opportunity knocks, *Research Policy*, 34 (9). 1404-1418.

Technology push or market pull. Success factors in detail.

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Technological opportunity = achieving technical advance normalized by the cost¹:

- ▶ technological significance*
- ▶ technological performance*
- ▶ technological feasibility
- ▶ technological uncertainty

User preferences²:

- ▶ compatibility with existing values, past experiences and future needs*
- ▶ relative advantages against the existing standard(s)*
- ▶ observability*
- ▶ complexity*
- ▶ triability

***Factors that depend totally or partially on how entrepreneurs/users perceive existing technology.**

¹ following: Cohen, William (1995). "Empirical studies of innovative activity," In P. Stoneman (Ed.). Handbook of the Economics of Innovation and Technological Change (P. 182-264). Oxford: Basil Blackwell.

² following: Rogers, Everett M. (1962). Diffusion of Innovations. Glencoe: Free Press

A paradigm change.

What if the transition from an old technology to a new one represents a change of paradigm?

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The revolution of knowledge.

► The Thomas Kuhn assumption:

(Scientific) Knowledge is structured as conceptual worlds.

► Revolution of knowledge:

A new paradigm emerges that is not only incompatible, but actually incommensurable with that which has gone before.

► Result:

There are two opposing camps and one that takes the victory.

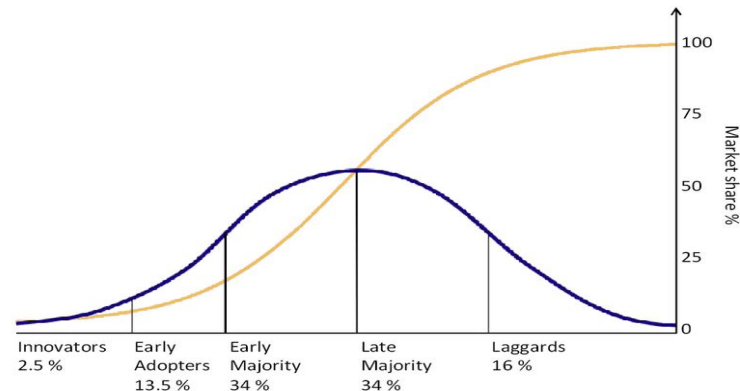
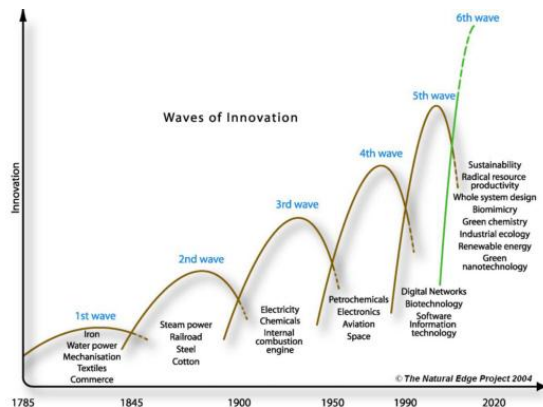
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¹ following: Kuhn, Thomas (1962). *The Structure of Scientific Revolutions*. Chicago: Chicago Press.

The condition for success of decentralized and smart power grids.

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Kuhn's philosophy of science as general epistemological approach: Capability to grasp the new paradigm as real success factor.



Behind both models we can assume „technological paradigms¹“ or „gratification paradigms“.

¹Kondratieff, Nicolai (1935). The Long Waves in Economic life. Review of Economic Statistics 17 (6). 105-115. and Dosi, George (1982). Technological paradigms and technological trajectories.

How to change the paradigm of a centralized and inflexible grid vs. a decentralized and smart grid.

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10 Rules

- 1 Make it visible.
- 2 Tell a story.
- 3 Create fantasy.
- 4 Be prepared for a fight.
- 5 Build alliances.
- 6 Don't argue with terms of truth or incorrectness.
- 7 Promote that it is a new paradigm.
- 8 Identify entrepreneurs that are eager to believe in the technological opportunity and identify early adopters.
- 9 Consider it a journey.
- 10 Draft a roadmap for the journey.

Many thanks for your attention.

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