

Success and Failure of «Green Innovations»

Start-ups: Product Pioneers for a Green Economy

Summary

The 100 environmentally friendly product and service innovations examined in the course of the project *Diffusion Paths of Sustainability Innovation*, funded by the German Federal Ministry of Education and Research, included 58 improvement innovations and 42 radical innovations. While some three quarters of all improvements were introduced to the market by established companies on their own (64%), or simultaneously with start-up companies (10%), some two thirds of all radical innovations are credited to start-up companies. For Germany's energy-policy turnaround and the goals of a «green economy», that means that start-ups in «green» lead markets are in the future to be stimulated and supported in a targeted manner. The important thing here is that start-up companies, to a much higher degree than established companies, are guided by «green» motives. This has implications both for the message of «green» start-up entrepreneurs, and for the manner of the subsidy and funding of start-ups in the areas of environmental technologies, clean tech and other «green» future-oriented markets.

About the research project: All of Germany is talking about the energy-policy turnaround, and yet the transition is moving ahead very slowly in business and society. While there is no lack of innovative technologies and solutions, not all of them succeed in establishing themselves on the market. However, why do certain «green» innovations succeed, while others fail? How are the ideas of sustainability disseminated? The project Diffusion Paths of Sustainability Innovations has addressed these issues. Funded by the Federal Ministry of Education and Research (BMBF) in the context of its Technology and Innovation Analysis (ITA) program, it investigated the market introduction and dissemination of 100 environmentally friendly product and service innovations (funding code 16 I 1601). The study is the first worldwide to systematically analyze the diffusion processes of such a large number of sustainability innovations, and to carry out an empirically supported ascertainment of the key factors affecting diffusion dynamics.

Creative destruction

One hundred years ago, the Austrian-German economist Joseph Schumpeter (1912/1983) explained the transformation of economic structures by means of the key role of entrepreneurship. New enterprises, he argued, develop creative and fundamentally new products and services, bring them onto the market, and thus crowd out existing, less efficient technologies and products of established companies. New companies are hence simultaneously creative and destructive. Schumpeter introduced the concept of «creative destruction»,

which he saw as being rooted in the fact that entrepreneurs and start-up businesspeople discover «creative answers» to changing conditions and challenges of their time. This «creative response» (Schumpeter 1947), and the radical innovations associated with it, are fundamentally different from the improvement and optimization of existing products and processes, which can be characterized as «adaptive response». To this day, it is possible to distinguish between different types of strategies for sustainability innovation on this basis.

Strategic types of sustainability innovations

PRODUCT FIELD	STRATEGIC ORIENTATION		
	Process	Market	Society
Path-optimizing (adaptive response)	Eco-efficient process optimization	Market-share protection and differentiation	Legally induced adaptation innovations
Path-generating (creative response)	Radical process innovations	Market creation and development	Visionary alternative models

Fichter, K. (2009)

Start-ups create innovations

The results obtained by the Diffusion Paths of Sustainability Innovations research project show that, depending on the degree of innovation, new companies on the one hand and established ones on the other differ in terms of their significance for the implementation and dissemination of innovative sustainability solutions. Among the 100 environmentally friendly product and service innovations investigated in the context of the present project, 58 were incremental innovations and 42 were radical innovations. While some three quarters of all incremental innovations were introduced by established companies either alone (64%) or simultaneously with start-up companies (10%), some two thirds of all radical innovations were accounted for by start-up com-

panies. Of the radical innovations, 55% were brought onto the market by companies founded specifically for the purpose of the respective innovation, and another 12% simultaneously with established companies.

In light of this result, it is possible to make a distinction regarding the knowledge to date of the role and significance of «Davids» and «Goliaths», respectively, in innovation and diffusion processes (cf. Hockerts und Wüstenhagen 2010): Start-ups and new companies are evidently the key market actors in the development and market introduction of radical sustainability innovations, while incremental innovations tend more to be the turf of established companies.

Who are the pioneers of sustainability innovation?

In how many cases (n = 100) was an innovation introduced to the market by an established company, or by a start-up company?		FIRST PROVIDER (PIONEER)			
		Established company	Start-up company	An established and a start-up company	Total
LEVEL OF INNOVATION	Incremental innovation	37	15	6	58
	Radical innovation	13	23	6	42
	Total	50	38	12	100

Significance of start-up and established companies, by type of innovation and by industry

PRODUCT FIELD	Market pioneer (first provider) Of 10 products/service innovations in this area, market introduction was accomplished by ...	Innovation type Of 10 product/service innovations in this area, the innovation type was	Type of innovation/industry combination
Low exergy-systems	start-up companies: 9 cases*	radical innovation: 10 cases	Radical innovations contribute to the emergence of a new industry (renewable energies)
Telecommunications and online services	start-up companies: 7 cases*	radical innovation: 8 cases	ditto (telecommunications/ Internet economy)
Renewable energy facilities	start-up companies: 7 cases*	radical innovation: 7 cases	ditto (renewable energies)
Organic food	start-up companies: 9 cases**	incremental innovation: 10 cases	Incremental innovations create a new market segment within established industries (agriculture/ food; trade)
Renewable raw materials	start-up companies: 7 cases**	incremental innovation: 10 cases	ditto (agriculture, chemistry)
Construction and heating materials	established companies: 7 cases	incremental innovation: 5 cases	Incremental innovations in established industries (construction, machine-tool industries); Radical innovations create new market segments
Sustainable mobility	established companies: 7 cases***	incremental innovation: 5 cases	ditto (transportation, logistics)
Energy-efficiency in computer centers	established companies: 8 cases***	incremental innovation: 8 cases	Incremental innovations in established industries (computer industry)
Energy-efficient electric devices	established companies: 9 cases	incremental innovation: 7 cases	ditto (electrical industry)
Green IT devices	established companies: 10 cases	incremental innovation: 9 cases	ditto (computer industry)

* Of which one was accomplished simultaneously with an established company

** Of which three were accomplished simultaneously with an established company

*** Of which one was accomplished simultaneously with a start-up company

INTERVIEW

What role do start-ups play in sustainable innovation?

PROF. DR. KLAUS FICHTER: *With regard to the question as to which companies and innovations dominate in which of the ten product fields examined, there is a clear pattern. With their radical innovations, start-ups contribute decisively to the emergence of new industries, such as renewable energies, low-exergy systems, telecommunications and the Internet economy. Moreover, in established industries, start-ups generate new market segments by means of incremental innovations. In the product fields investigated, this was true for organic foods and renewable resources.*

DR. RALF WEISS: *In such product fields as construction and heating technology, or sustainable mobility, which are located within mature industries, established companies are dominant in the market introduction of environmentally friendly product and service innovations. However, their market innovations are primarily incremental innovations. But there too, radical innovations and the market segmentation usually associated with them are primarily the province of start-up companies. In such mature industries as the electric industry and the computer industry, established companies dominate the innovation activity. The new market introductions made by these established market actors are largely limited to incremental innovations.*

Has the significance of pioneers for the «green economy» already established itself in the public consciousness?

PROF. DR. KLAUS FICHTER: *Research results show that both start-up companies and established companies are important for the development, market introduction and dissemination of sustainability innovations; however these are of varying significance, depending on the degree of innovation and the phase involved. Both radical and incremental innovations are needed for climate protection, the expanded use of renewable resources, and other green economy goals. The need for efforts by established companies to make their products and services more resource efficient and more environmentally friendly has already been addressed by many political initiatives and legislative measures, such as «greening Goliaths.» On the other hand, the significance of start-ups for the «green economy» has received too little attention so far.*

Are sustainability innovations a profitable business model?

DR. RALF WEISS: *As to the question of who the pioneers in the development and market introduction of sustainability innovations are, it is necessary not only to distinguish between start-ups and established companies, but also with regard to the motives or goals which cause the market pioneers to develop their environmentally friendly products or service*



The «green goals» of market pioneers of sustainability innovation

	FIRST PROVIDER (PIONEER)			
	Established company	Start-up company	An established and a start-up company	Total
In how many cases (n = 100) was an innovation introduced to the market by an established or start-up company with an explicitly «green» or sustainability-oriented corporate profile?				
Explicitly «green» or sustainability-oriented corporate profile?	6	23	8	37
«Green» or sustainability-oriented goals are secondary	12	2	1	15
No explicitly «green» or sustainability-oriented corporate profile	32	13	3	48
Total	50	38	12	100

innovations. Here, it appears that sustainability innovations are not at all primarily developed and disseminated by companies with exquisitely «green» or sustainability-oriented corporate profiles. Half the 100 sustainability innovations investigated were introduced by market participants who did not pursue any explicitly environmental or sustainability-oriented goals. Here, it can be assumed that it was largely business or profit-oriented motives that played the main role. In twelve cases, the first providers did have «green» or sustainability-oriented corporate goals, although these were clearly secondary for those companies. In somewhat more than one third of the cases examined, environmentally friendly products or services were introduced to the market by «green» pioneers, in other words, by companies for which environmental protection and sustainability were central corporate goals.

PROF. DR. KLAUS FICHTER: *It is notable that start-ups were to a much larger degree motivated by «green» goals than were established companies. Considerably more than half the 38 start-up companies which were the first market providers of sustainability innovations did so in order to make a contri-*

bution to a «green» mode of economics. Only one third of the start-up companies had no explicit sustainability-oriented goal definition. This result is of great significance for start-up support, since it shows that the bulk of start-ups in the area of environmental technology, cleantech and other «green» future-oriented markets are strongly driven by sustainability. This has implications for the message of «green» start-ups, as well as for the manner of supporting and financing them.

How are «green» start-ups currently being supported by government?

DR. RALF WEISS: *Although the fact that entrepreneurs and start-ups are the engines of structural change is one that is known in theory, it has hardly been reflected at all in subsidy policies for environmental technologies or «green» lead markets, or in policy strategies for the transformation to a «green economy.» The same is true for the support of start-ups. Although Germany has an extensive system for supporting innovative start-ups, the targeted support for start-ups in «green» lead markets, or the stimulation of innovative start-ups oriented toward a transformation to a «green economy» hardly exist at all to date.*



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DR. RALF WEISS is a senior researcher at the Borderstep Institute for Innovation and Sustainability. Central to his research are questions of the development of new products and areas of business for opening up sustainability markets, as well as sustainable entrepreneurship, sustainable innovation and sustainable venturing.

What is to be done?

On the basis of investigative results, important conclusions and recommendations for action regarding the energy-policy turnaround and the goals of a «green economy» have been formulated:

Research and innovation support:

- Targeted support for SME pioneers in «green» lead markets, as a strategy for «upscaling the Davids», and the evolution of both niche and mass markets
- Targeted support for «green tech» innovation communities, to support cluster formation in areas of environmental technologies/cleantech, and support for «emerging Davids.»

Start-up support:

- Lead-market-oriented start-up support: «Multiplying Davids» in green lead markets, such as electro-mobility, renewable energies, renewable resources, recycling, etc.
- Making tailored forms of venture capital available for «green» start-ups
- Establishment of «green» start-up centers, e.g. in the area of cleantech and climate innovation
- Incorporation of sustainability criteria in business-plan competitions
- Awarding of sustainability-oriented start-up prizes, e.g., a national climate-protection start-up award.

Diffusion and structural support

- «Greening Goliaths»: Improved incentives for established companies to enter into «green» future markets (participation in or takeover of green start-up companies, etc.), e.g., through binding and long-term framework setting by government in favor of «green» lead markets
- Support for effective business association structures in young «green» industries.

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