

Transition towards sustainable energy and food consumption

The importance of role models for sustainable behavior

Different theoretical concepts and their empirical application display an agreement on un-sustainable consumption behavior. They suggest important roles for modes of consumer choice that do not follow an optimization calculus. Role models like peers, pioneers or change agents are important in overcoming non-sustainable behavioral routines. By **Marco Lehmann-Waffenschmidt and Heinz Welsch and Reinhard Pfriem**

The project WENKE² integrates several theoretical perspectives on the diffusion of sustainable consumption and applies these frameworks to the consumption of energy and food in the residential sector. The basic research question asks why sustainable consumption patterns have only partly diffused to this point. It is the aim of the project to identify constraints to the adoption of sustainable consumption patterns and to develop operational concepts for fostering a process of change towards the sustainable evolution of energy and food consumption. By integrating several theoretical and empirical approaches, the project aims to contribute to the emerging field of economics of sustainable consumption.

The theoretical perspectives adopted in the project represent a departure from the standard rational choice model of consumer behavior, though admitting rational choice as a special case. The frameworks considered come from behavioral economics, evolutionary economics, and interactional and institutional economics.

Empirically, the research conducted in this project refers to the use of solar thermal systems, subscription to green electricity programs, and consumption of organic, regional and fair trade food. Project-specific data comes from special surveys and qualitative interviews performed in North-West Germany.

Behavioral analysis of sustainable consumption

The literature on behavioral economics has criticized the standard rational choice model of consumer behavior in two ways. The first criticism focuses on decision errors. The maintained hypothesis is that people strive to maximize utility but fail to attain the utility maximum due to imperfect knowledge of the utility consequences of their choices. Using self-reported life satisfaction as an empirical approximation to utility, Module 1

of the project found that life satisfaction of a representative person is an increasing function of environmentally friendly consumption. Since a utility maximum would require that an increase or decrease in environmental friendliness has no effect on a representative individual's satisfaction, this evidence suggests that environmentally friendly consumption is on average less than utility maximizing. Moreover, it was found that the decision error is smaller when people's education level is higher, their value orientation is less materialistic, and when environmentally friendly consumption is more widespread in society.

The second criticism calls into question the general validity of utility maximizing behavior as a mode of choice and claims that an evaluation of all available options with the aim of maximizing utility is an exception rather than a rule. Instead, choice heuristics play an important role, which involve the behavior of reference persons and routine behavior. Regarding this hypothesis, Module 1 found that behavioral conformity with reference persons like neighbors, friends or relatives is an important factor in purchases of solar thermal units and organic food, and to a lesser degree in the subscription to green electricity programs. The intensity of buying organic food (always versus often) is greater the longer people have been buying organic food, which suggests an important role for behavioral routines.

An evolutionary agent-based model

The aim of Module 2 is to construct and analyze an evolutionary agent-based simulation model of self-organized market evolutions with an analytical focus on sustainable consumption. MONAKO, short for Modell zum nachhaltigen Konsum, is implemented with the free simulation software LSD and has been adapted to the German food market with current empirical data from the consumer side.

MONAKO is applied in a scenario analysis which shows, in contrary to popular beliefs, for instance ...

- that the thesis "more competition promotes sustainable consumption" can only be confirmed if the food market is a creative one, like for example the internet branch where creative knowledge is decisive for success in the market. These findings corroborate the thesis of the young Schumpeter that progress is a process of creative destruction (Schumpeter 1912). So we call it, following Nelson and Winter, a Schumpeter-I-market (Nelson/Winter 1982). Nevertheless, also in the food market knowledge must be accumulated to improve products. In accordance with the late "success breeds suc-

cess" thesis of Schumpeter, the Schumpeter-II-market, MONAKO shows that less competition promotes sustainable consumption patterns (Schumpeter 1942). In addition, in a Schumpeter-neutral-market more or less competition does not promote sustainable consumption. Thus, the popular "competition thesis" can only be confirmed by MONAKO for certain condition constellations.

- that the thesis "more scandals promote sustainable consumption" can be only weakly supported.
- that the thesis "more uncertainty on the market promotes sustainable consumption" can only be confirmed under certain conditions. The willingness of consumers to change products decreases because they try to orientate themselves on other uncertain consumers and thus, firms stay a long time on market. This promotes sustainable consumption only in a Schumpeter-II-market, but solely from a supply-push progress, and not with active promotion of the consumers. If the firms' experience advantage is dropped in a Schumpeter-I-market, the rigid market structure even becomes a market entry barrier for young firms, and the diffusion of sustainable consumption patterns is blocked.

Theory of learning consumers

While neoclassical consumer theory leaves open the question of why consumers regard certain products as useful and how they have come to form an understanding of product utility, the theory of learning consumers explicitly deals with the role of consumer motivation and learning processes in changing consumption patterns. Module 3 elaborates on the implications of the learning theory for the emergence of more sustainable consumption patterns.

Making use of the consumer survey in North-West Germany, we specifically examine the driving forces underlying the original adoption and the upgrading of solar thermal systems (STS). Differentiating consumers into owners and non-owners of STS, we analyze whether the following factors determine consumer behavior at distinct stages of the diffusion process: positive environmental attitudes, knowledge of the functioning of STS and the presence of STS among peer consumers. Arguably, present owners of STS are all equally environmentally concerned and knowledgeable while later adopters might acquire solar equipment simply on the basis of peer pressure. In line with our hypotheses, neither peer effects nor environmental attitudes increase the likelihood that owners of STS will expand their solar equipment. Their ecological concern is more likely to have determined their original investment decision. Consumers currently not being equipped with a STS are more likely to plan the purchase of this technology when their peers already possess this product. Moreover, consumers are more likely to develop an interest for STS the more ecologically concerned and knowledgeable about STS they are.

Module 4 is based on two theories, interaction economics and institutional theory, and links the concept of key actors with

the one of institutional arrangement. Key actors are defined to have a significantly higher influence on the development, implementation and diffusion of new solutions than other actors. They cannot only be found in the group of producers and consumers, but also among intermediaries. In addition to the classic type of market intermediaries like brokers or retailers, we introduced and examined the role of political intermediaries like climate protection agencies or fair trade non-governmental organizations. With the second perspective we assume that, beyond the scope of an individual institution, in particular the institutional interplay considerably affects the actors' actions.

Intermediaries and institutional interplay as drivers

The empirical results confirm that intermediaries play a key role in overcoming barriers of sustainable consumption. In particular political intermediaries take on an important role in initiating and stimulating market developments in early diffusion phases. Furthermore, the existence of pioneers among the market intermediaries is favorable for speeding up the diffusion of sustainable consumption patterns. The central function of both types of intermediaries is to develop a critical mass and to stimulate self-energizing imitation effects in order to enable an endogenously produced high-momentum course of a diffusion path for sustainable consumption patterns.

The hypothesis that for promoting practices of sustainable consumption all institutional types are relevant, was also confirmed for both fields, nutrition and solar thermal energy. Also as assumed, the institutional focuses differ between both fields of consumption. In the field of solar thermal energy, especially regulatory rules and incentives, climate and environmental awareness, trust in tradesmen as well as the market are mainly influential. In the field of nutrition, the most influence comes from seals and certificates of quality, the market, the persuasion per sustainable products, the social environment as well as shopping and eating habits. The majority of intermediaries consciously consider themselves, even if all in all to a modest extent, as an institutional entrepreneur.

Cultural approach in sustainable consumption

The cultural approach of Module 5 is based on the theory of social practice which locates the source of significant patterns in how conduct is produced and performed in interaction and recursively. Thus, economic practice combines both the incorporation of routines (culturally based knowledge) and the performance of a competent doing or saying (doing knowledge). Apart from routines as procedures of reproduction, there exists a high relevance of creative and innovative potential in cultural competences of agents (Antoni-Komar et al. 2010). Viewed in the context of theoretical findings, four directions of research are empirically improved by qualitative data and have been →

transformed into four scenarios for MONAKO. Below, some results are outlined:

- Cultural factors in food practices like shopping routines and eating habits or the inconvenient visibility of solar thermal systems against the use of invisible energy production systems are constraining sustainable consumption patterns.
- Food or energy practices become fragile and are (re-)interpreted against the role model of peers whereas the authenticity of personalities is a substantial condition. An important constraining factor has been identified in the female fear of attracting attention by the visibility of solar thermal systems.
- In order to overcome the lack of transparency, cultural competences as an interactional potential help to (re-)contextualize the processes of supply and demand.
- Routines are rejected by conflicts and opportunities. In the use of solar thermal systems, windows of opportunity are often not recognized. However, we could identify a high relevance of health consciousness and awareness of ethics as promoters for changing food practices to sustainable consumption patterns.

In spite of different termini technici, the five modules of WENKE² share central hypotheses on consumer behavior and its changes over time. The evolutionary agent-based model MONAKO gives Module 2 a special position for the aim of integrating the different theoretical approaches in WENKE². MONAKO is an evolutionary model for the German food market which gives the basis for a systematic simulation analysis of the promoters and obstacles of the evolution of sustainable consumption patterns in a population. The fact that all modules are interested in a self-organizing evolution of consumption patterns towards more sustainability gives the fundament for the evolutionary analysis approach of MONAKO to integrate the different theoretical approaches of WENKE².

The behavioral economic approach

The behavioral economic approach of Module 1 focuses on the consumer side. The regression analysis of Module 1 shows that consumers are subject to a systematic divergence between decision benefit and experience benefit from sustainable products. This divergence decreases when sustainable consumption is more widespread in society.

The ex-ante/ex-post divergence is incorporated by MONAKO as a basis for intertemporal learning processes that allow for the correction of this benefit divergence. The empirical analysis of Module 1 also shows that a “more correct evaluation” of the sustainability quality in separate consumer groups diffuses in society over time. This social learning substantiates the importance of peers for promoting sustainable consumption.

MONAKO confirms for example the hypothesis of Module 1 that stronger intertemporal learning promotes the evolution of sustainable consumption patterns, under the condition of a very strong distorted perception of sustainable products. Furthermore, MONAKO shows that more peers’ influence can promote

sustainable consumption. In Schumpeter-I-markets and Schumpeter-neutral-markets the stronger social comparison in consumption promotes the social diffusion of sustainable consumption patterns. In a Schumpeter-II-market both types of influence, a weak and a strong peers’ influence, cause a narrow market in the sense of a small number of suppliers. This is in accordance with the general effect of a Schumpeter-II-market regime. Consequently, there is no additional effect promoting the diffusion of sustainable consumption. This means that MONAKO supports this hypothesis of Module 1 under certain conditions.

The theory of the learning consumer

Module 3 is represented in MONAKO by a consumer side modeling that accentuates the role of specific consumers, so called specialists, who are no imitators, have a high environmental awareness, and are characterized, in contrast to non-pioneers, by a high information absorption degree which causes a specialization towards the consumption of sustainable products. The other consumers are the non-pioneers who more likely imitate, or consume by habit. Therefore, sustainable relevant information has an important influence on preference changes. The probability of a behavior change through a preference change increases with increasing information density. This is true for all consumers though they have individual perception thresholds.

Consequently, for the integration of Module 3 into MONAKO the existence of consumption pioneers who have special qualities, like for example a higher sensibility for sustainability information is relevant as well as those model elements which are important for information generation and absorption.

For the central hypothesis of Module 3 MONAKO shows: More influence of habits inhibits, more deliberation promotes sustainable consumption in Schumpeter-I- and in Schumpeter-neutral-markets. However, in a Schumpeter-II-market the fast deliberation motivated changes of products by the consumers prevent the use of the accumulation advantages which are relevant for this market regime. Therefore, sustainable consumption patterns are not promoted under these conditions. MONAKO models a scenario with less influence of habits and more social comparison by assuming more uncertainty and dissatisfaction on the consumer side in the market. Thus, pioneers imitate themselves. In this way, they no longer give a positive example for sustainable consumption. Nevertheless, almost all consumers orientate themselves on the pioneers. This consumer side concentration on one, or only a few suppliers, causes a slight promotion of a sustainable consumption pattern in Schumpeter-II-markets because it uses the accumulation advantages of the regime. In summary, MONAKO supports this hypothesis of Module 3 under certain conditions.

The central hypothesis of Module 4 is that key agents and intermediates are relevant for the diffusion of sustainable progress, and they can, but need not, be located on one of the mar-

ket sides. Therefore, the integration of Module 4 in MONAKO proceeds firstly, on a third, exogenously modeled market level which is formed by political intermediates who convey information and knowledge to consumers and firms, and create with this awareness for specific problems. And it proceeds, secondly, on the well-known market sides of demand and supply. Key agents are opinion leaders in the social system who are characterized by their innovativity and by special charisma. Therefore, they form a type of pioneer which is relevant for both, consumers and firms, as a positive social example.

The interaction approach

MONAKO shows that there is a small influence of supply side key agents on the evolution of sustainable consumption patterns because their typical role for other firms is restricted in MONAKO. MONAKO confirms, however, the strong influence of the demand side key agents. If we further assume that not only pro-sustainable key agents are absent from the market, but even anti-sustainable key agents are present, MONAKO shows once more a small influence of the supply side key agents and a strongly inhibiting influence of the demand side key agents. How strong this inhibition is, however, depends on the Schumpeterian regime on the one side, and on the other side on the type of anti-sustainable agents, that is which product characteristic they promote instead. MONAKO shows, for example, that in a Schumpeter-I-market the firms which are smaller and younger even have an advantage in this market by using more price competitiveness. Thus, a sustainable consumption pattern is inhibited only middle-term and it will catch up on the diffusion dynamic in the reference scenario at the end of the simulated time horizon.

The cultural approach

The cultural approach of Module 5 encompasses both market sides, the supply and the consumer side. The central assumption of Module 5 says that consumers and firms have an intrinsic interest in environmental problems. Therefore, in MONAKO individual information thresholds show consumers and firms, respectively, when the dissonance between their environmental orientation and their factual activities becomes significantly large. Usually this results in a change in the consumption, or production, practices towards more sustainable consumption. Furthermore, the subjects of crisis and conflict which are essential for Module 5 are integrated in MONAKO.

MONAKO particularly supports the hypothesis of Module 5 that a lower importance of consumption routines promotes the diffusion of a sustainable consumption pattern. This effect is strongest in a Schumpeter-II-market because in this regime new firms have better entry chances.

Furthermore, MONAKO analyses a special aspect of sustainability which is stressed by Module 5. An important feature of a sustainable consumption pattern is the feedback effect on

the perceived quality of the fundamental life conditions which in turn influences the producers' and consumers' market decisions. Analyzing the intensity of these feedback effects in MONAKO leads to the following results. In a Schumpeter-neutral and in a Schumpeter-II-market an intensified feedback loop causes more pro-sustainable preference changes, which in turn promote the diffusion of a sustainable consumption pattern. However, in a Schumpeter-I-market the effect of more uncertain firms dominates, and this results in an inhibition of the diffusion of a sustainable consumption pattern.

Summing up, MONAKO helps to assess the hypotheses of each module of the WENKE² project in a competitive market context. MONAKO focuses on a differentiated analysis of the effects of certain influences stressed by the modules on the diffusion of sustainable consumption pattern. On one side, MONAKO achieves a quantitative contribution for the integration of the different theoretical approaches in WENKE². On the other side, MONAKO also contributes to a qualitative integration of the theoretical approaches by figuring out the parallels and differences between the conclusions of the modules on the basis of scenarios which are conceptualized and formalized by Module 2.

References

- Antoni-Komar, I. / Lautermann, C. / Pfriem, R.: Kulturelle Kompetenzen. Interaktionsökonomische Erweiterungsperspektiven für den Competence-based View des Strategischen Managements. In: Bellmann, K. et al.: Jahrbuch Strategisches Kompetenzmanagement. München 2010.
- Nelson, R.R. / Winter, S.G.: An evolutionary theory of economic change. Cambridge 1982.
- Schumpeter, J. A.: Theorie der wirtschaftlichen Entwicklung. Eine Untersuchung über Unternehmerrückgewinn, Kapital, Kredit, Zins und den Konjunkturzyklus. Leipzig 1912.
- Schumpeter, J. A.: Capitalism, Socialism and Democracy. New York 1942.
- Welsch, H. / Kühling, J.: Determinants of Pro-Environmental Consumption: The Role of Reference Groups and Routine Behavior. In: Ecological Economics 69/2009, S.: 166-176.
- Welsch, H. / Kühling, J.: Pro-Environmental Behavior and Rational Consumer Choice: Evidence from Surveys of Life Satisfaction. In: Journal of Economic Psychology (2010, forthcoming).

■ AUTHORS + CONTACT

Dr. Marco Lehmann-Waffenschmidt is professor of Economics at the Dresden University of Technology.

Dresden University of Technology, Department of Economics, 01062 Dresden, Germany. Phone: +49 351 46336098, Fax: +49 351 463 372 85, Email: manaecon@mailbox.tu-dresden.de

Dr. Reinhard Pfriem is professor of business management at the University of Oldenburg.

Dr. Reinhard Pfriem, Department of Economics, University of Oldenburg, Ammerländer Heerstr. 114-118, 26129 Oldenburg, Germany. Phone: +49 441 798-4182, Fax: +49 441 798-4193, Email: reinhard.pfriem@uni-oldenburg.de

Dr. Heinz Welsch is professor of economic theory at the University of Oldenburg.

Dr. Heinz Welsch, Department of Economics, University of Oldenburg, 26111 Oldenburg, Germany. Phone: +49 441 798-4112, Fax: +49 441 798-4116, Email: welsch@uni-oldenburg.de

(c) 2010 Authors; licensee IÖW and oekom verlag. This is an article distributed under the terms of the Creative Commons Attribution Non-Commercial No Derivates License (<http://creativecommons.org/licenses/by-nc-nd/3.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.