Open Innovation for Sustainable Futures

Gerald Beck
Researcher
MPS - Munich Institute for Social and Sustainability Research
Hermann-Lingg-Straße 10, D-80336 Munich
E-mail: gerald.beck@sozialforschung.org
www.sozialforschung.org

Cordula Kropp
Professor for Social Innovation Studies
Munich University of Applied Sciences
Am Stadtpark 20, D-81243 Munich
E-mail: cordula.kropp@hm.edu
www.sw.fh-muenchen.de

Dennis Odukoya
Research Assistant
MPS - Munich Institute for Social and Sustainability Research
Hermann-Lingg-Straße 10, D-80336 Munich
E-mail: dennis.odukoya@sozialforschung.org
www.sozialforschung.org

Open Innovation – promises and prerequisites (introduction)

Innovative products and services to enhance sustainability – as there are low/zero-energy buildings, zero-emission vehicles or intelligent mobility concepts for the future – often stay in the corner of the market or lack, in spite of their technical potential, customer's acceptance at all. But positive effects for the environment can only be achieved if ecological products are successful on the market and if they are widely used. Processes of open innovation promise to improve the market introduction and the distribution of products by directly involving later users and their ideas in the design process (von Hippel 1998, Reinicke 2004, Piller & Walcher 2006). The integration of (especially "lead") users in innovation processes is expected to incorporate customers' ideas into new product development, to improve customers satisfaction, to early detect unintended side-effects in later contexts, to foster public awareness and thus to accelerate the distribution of innovative products and services. This is why open innovation collaboration and user integration is assumed to produce products that are better adapted to the needs and expectations of users' everyday life and to better capture markets.

Following these promises our research analyses some processes of open innovation asking under which conditions user integration can deploy its potential to enhance sustainability and to bridge the well known market barriers of sustainable products and services[1]. The paper especially focuses on the question to what extent *representation* of the human and non-human actors involved in an innovation network has to be considered as *basic prerequisite* to fully tap the potential of open innovation. To make a long story short: our assumption is that the frequently observed serious gap between innovative ideas emanating from user integration and their actual execution results from incomplete representation of these actors.

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The huge expectations towards processes of open innovation partly result from some well-known empirical evidences, as there are the hydration pack invented by a sportive medical who combined his experience as a thirsty bike rider with his daily use of infusion bags or the development of windmills in Denmark, that have primarily been developed by anti-nuklear activists (Jørgensen & Karnøe 1995). Partly open innovation is considered as an adequate strategy to deal with the postmodern gap between pluralized consumer worlds on the one hand and homogeneous engineering cultures on the other. At the same time there is growing insight that the success of open innovation processes depends on various factors, namely on a) motivation, (long-term) commitment and personal profit of the users involved (Reichwald & Piller 2006, Ornetzeder & Rohracher 2006) and b) on an adapted timing, organisational context, the information at hand, and the type and stage of maturity of the technological regime in which the innovation is to be realised (cf. Fredberg, Elmquist & Ollila 2008). Moreover– our argument is – that its success depends on c) satisfactory representation of the defining parts of the innovation network which forms the basis of the innovation process and whose interfaces have to be managed. Open innovation therefore has to care for the *well-directed integration* of consumers, users and merchants in processes of design, development and commercialisation – considering the innovation process from the very first idea to the final bringing onto the market in all its aspects. Nevertheless, up to now we still miss deeper understanding about the questions "Which users should best be integrated?" and "When and how should they be integrated?". Thus Ornetzeder et al. (2008) resume „integration of users is seen as a valuable strategy, but there seems to be some uncertainty concerning appropriate forms of integration for different tasks and goals" (Ornetzeder et al. 2008: iii). All enthusiasm about open innovation and user integration should not let us forget that it is essential for the success of open innovation processes to integrate the actors who really take the decisions in research and development. Without them, innovations and new product development in all probability will fail in any organizational context.

Case Study

This is why we investigate in how far different formats of user integration can help to foster sustainable innovations to better penetrate given markets and at the same time reduce emissions and consumption of energy and resources. In the three realms of low-energy buildings, combined mobility concepts and bio-plastics several methods of user integration have been realised together with our research partners and in cooperation with leading companies ready to invest in open innovation in the respective development processes: In all three domains several two-day innovation workshops have been conceptualized and run partly with lead users partly with other customers. Secondly, user idea contests have been launched and evaluated for innovation in combined public mobility services and packaging design based on bioplastics. And finally in the case of low-energy buildings embedded open toolkits have been developed to allow future inhabitants to improve design and technologies following their needs.

Key factors for successful distribution

To orientate the involvement of customers towards sustainability and later market success, in preparation of the various methods of user integration key factors for successful distribution have been identified for each of the involved market spheres of housing, mobility and packaging by the help of scenario-oriented expert interviews and secondary analysis. The development of these key factors was not limited to the consumers' perspective in the sense of casual market research. We also tried to

consider the interests and possibilities of the providers as well as the general framework for the development of innovations. For only the consideration of all these conditions makes the creation of scenarios of user-integrated innovation possible. These key factors have been further elaborated during the innovation workshops to direct the emerging innovative ideas and concepts towards sustainability in general and to constructively reconsider market restrictions and opportunities as well.

Combined Mobility	Low-Energy Buildings	Bioplastics
Convenience	Location and Surrounding	Aesthetics
Information	Costs of Building	Product-Presentation
Safety	Operating Costs	Advertisement
Social Appreciation	Size and Partitioning	Information
Safety	Qualitative Characteristics	Protection
Costs	Aesthetics	Credibility
Time	Perspective of Usage	Handling
Distance	Information	Packaging-Cycle
Interconnection	Living Convenience	Sustainability
Intention of Mobility	Climate-Conscience	Recognition
	Government Aid	
	Freedom of Design	
	Fear of Technology	

Table 1: Key factors for the three case studies.

The key factors and a description of their role in distribution and commercialisation was part of a workshop exercise. First, the participants developed visions of the future for the relevant field of action (mobility, housing, packaging). For example one group developed the idea of flying taxis that collected some of their friends for a Sunday trip to the countryside. Then, they have been asked to tell how they would manage the situation "Sunday trip to the countryside with friends" today with existing opportunities and what are crucial barriers and drivers of these existing opportunities. Listening to the participants explanations the moderator pinned those key factors on a chart which had been articulated in the stories about today's problem solving. Thus participants developed sensibility for the key factors which became further discussed in order to give the participants a chance to take them into account when they develop innovative concepts during the following creative steps in the innovation workshops.

First Results

What are the results when analysing the various processes of open innovation concerning their potential to enhance sustainability and to bridge the market barriers of sustainable products and services.

1. Interestingly, in all three domains information and crosslinking are the high-scorers when it comes to crucial key factors to improve the distribution of sustainability innovations. Moreover the set of previously identified key factors and their specifications proved to be sufficient. Through the various scenario-orientated interviews with experts and users we were able to cover a wide range of possible demands in every involved market sphere.

Accordingly nearly every contribution of the workshop participants could be translated into our set of key factors. Next to information and crosslinking, costs played an outstanding role in all three domains. But there are also some specific high-scorers to be named. In the field of mobility the expenditure of time was seen as very important for the acceptance of new services. In the field of housing the participants also focused on infrastructural features and energy-efficiency. When it came to packaging aesthetics, credibility and usability were seen as the most important aspects.

2. During their further development of ideas and concepts the workshop participants stayed well aware of the possible requirements of successful market introduction. But unfortunately actual sustainability turned out to play a subordinated role in the considerations of the participants. During the workshops we operated with a notion of sustainability that included not only ecological, but also economical and social aspects of sustainability. Our intention was to give the users a broader perspective and a deeper understanding of the complexity of sustainability. But it seems that this broader perspective led to the presumption that nearly every innovation could be considered as more or less sustainable. One could even say, most of the participants still tend to associate innovation with increasing convenience not with ecologically more benign solutions. There seemed to be no attendance to give up any feature of comfort for the sake of (ecological) sustainability.

3. Furthermore, we noticed that the users had serious difficulties to deal with the complexity of sustainability together with the needs of future commercialisation: Users tend to focus on *one* aspect respectively *one* concern which they esteem to be the most pressing for their respective consumption strategies: sustainability considerations are in themselves very complex and moreover mostly not in the centre of users' motivation who focus more on accessibility, information, additional features, saving of time and money. To give an example: one innovation workshop ruled together with a provider of mobility services focused on innovative concepts for using emerging information technologies to combine mobility offers. It resulted in mainly interesting suggestions for web based marketing of existing possibilities at lower prices. The argument of the users was that the more people could be convinced to use public transportation, the cheaper the services could be offered and the more carbon dioxide emissions could be saved. Even though their ideas have been assessed as innovative ideas for marketing public transportation, the potentials of more groundbreaking concepts of combined mobility could not be exhausted. Concentrated on their core concern of better information about existing offers and low prizes, the users left innovative possibilities of linking different transportation media completely apart. At the same time comparing the results of all processes of open innovation in the domain of mobility made clear that different social groups highly vary in their priorities (for instance older people and students) so that open innovation directed to cover the economic potentials of diversifying markets should consciously select different target groups.

4. But the biggest barrier for the enhancenment of sustainabilitiy innovations via open innovation is the following: None of the innovation workshops resulted in immediate activity at the side of the companies: the often-complained execution gap. Only after the workshops we recognized, that in all cases the companies had sent persons responsible for marketing and market analysis to care for the open innovation but not those in charge of product

engineering and design. Thus the transfer of the innovative concepts emanating from processes of open innovation into the development of new products and services was not assured. On the contrary, in the companies those who are responsible for product development and manufacturing commented sceptical - or not at all. The companies proved to be more interested in exploring the needs and interests of users for marketing purposes than in seriously involving customers in product development and design. The users in reaction felt somewhat disappointed to find themselves only half-heartedly integrated and not to see their concepts carried out. Not only the well-known symptom of "not invented here" blocked to pick up of the developed concepts but moreover the link between external and internal innovation seems to lack completely. Although expensive and resource-demanding processes of open innovation had been organized together with the research team, after their accomplishment the missing management of the interface between user integration and product development became evident: neither the board of management, nor the financial or engineering departments responsible for any execution had been involved for reasons beyond our control.

Representation in innovation networks

These results focus our attention on questions of representation, namely which actors have to be involved to represent a) the diversity of customers and their respective interests, b) sustainability as an up to now not fully tackled challenge, c) sustainability in all its complexity and d) the internal decision makers perspectives. To explain these findings we part from the assumption that new product development takes place in what we call "innovation networks" characterized by a dynamic of expansion (inspired by ANT). Innovation networks enrol various human and non-human actors in a way to complete strategies (programmes), which are mainly defined by those actors powerful enough to direct the paths and steps of others (Latour 1991, 1996). Open innovation can thus be seen as a strategic addition in innovation networks directed to enrol those actors who might contribute elements, which guarantee a bigger success for the expansion of the innovation. As research in science and technology studies has documented, technology and innovation should not be taken for granted following the one best way or technologically defined needs but is mostly determined by underlying strategies and social interests (Bijker, Hughes & Pinch 1987, Bijker & Law 1992, Akrich 1995). From this point of view open innovation is an instrument to improve the representation of "missing" parts of the network – without at the same time forgetting those central parts already engaged in the network. In this spirit the success of open innovation mainly depends on its capacity to represent missing parts to enlarge and stabilize the network as well as defining parts to relate to existing connections. Thus the important questions of representation are:

• *Whose concerns* are represented in processes of open innovation and to the benefit of what and whom? Which consumer worlds are represented in "open innovation" – lead users alone or those in need of better adapted offers as well? To what extent the selection of interests as well as the selection of ideas is to be qualified as the „right" one – be it for reasons of sustainability, of successful commercialisation, of developing new markets or to meet the needs of up to now ignored user groups?

- *Which gatekeepers* of the underlying innovation network are integrated in its strategic enlargement? Is the user integration well directed not only to contribute to the innovation process at hand but also when it comes to technically realise the ideas in companies and existing supply chains: Are all relevant decision makers on board and prepared to cooperate?

- Which *technologies and infrastructures* of the complex innovation network are represented in the open innovation? Which *knowledge* is considered, which is blanked out? To what extend are the constraints and possibilities of the technical progress, the expectations of civic interest, the regulatory framework of future applications and the rights of the involved users considered and integrated into the development efforts?

To sum up, our analysis suggests that the applied open innovation methods can contribute considerably to the creative and social learning capacities of the actors involved. However, some representational shortcomings have been detected which produce problems concerning transfer of ideas into realisation and to consider a broader and ecological demand articulation. In contrast an approach conceptualising open innovation as a consciously managed addition of existing innovation networks sensitizes for representation as a main criteria to assure its success. The focus is than to evaluate to what extent the selection of actors taking part in the open innovation processes – the involved users as well as the competent authorities of the underlying innovation network – is representative for the vital strategies and programs of expansion defining the network at present and opening up its enlargement-potentials for the future.

References

Akrich, M. 1995, "User representations: practices, methods and sociology" in Managing Technology in Society, ed. A. Rip, T. Misa, & J. Schot, Pinter, London, pp. 167-184.

Bijker, W, Hughes, T. & Pinch, T. 1987, The Social construction of technological systems: new directions in the sociology and history of technology, MIT Press, Cambridge

Bijker, W. & Law, J. 1992, Shaping technology / building society: studies in sociotechnical change, MIT Press, Cambridge

Fredberg, T, Elmquist, M. & Ollila – Chalmers, S. 2008, Managing Open Innovation: Present Findings and Future Directions, VINNOVA Report, Available:
http://www.vinnova.se/In-English/Publications/Products-hidden/15915/ [8 August 2009]

Jørgensen, U. & Karnøe, P. 1995, "The Danish wind-turbine story: Technical solutions to political visions?" in Managing technology in society, ed. A. Rip, T. Misa, & J. Schot, Pinter, London, pp. 57-81

Latour, B. 1996, Aramis or the Love of Technology, Harvard University Press, Cambridge

Latour, B. 1991, "Technology is Society Made Durable" in A sociology of monsters: essays on power, technology and domination, ed. J. Law, Routledge, London, pp. 103-131.

Ornetzeder, M. & Rohracher, H. 2006, "User-led Innovations and Participation Processes: Lessons from Sustainable Energy Technologies", Energy Policy, vol. 34, no. 2, pp. 138-150.

Ornetzeder, M, Rohracher, H, Schreuer, A, Loibl, H, Eder, A, Weinfurter, S, Strobl, S. 2008, Open Innovation, Available:
http://www.fabrikderzukunft.at/results.html/id4406#h1 [15 September 2009]

Piller, F.T. & Walcher, D. 2006, "Toolkits for idea competitions: a novel method to integrate users in

new product development", R & D Management, vol. 36, no. 3, pp. 307-318.

Reinicke, T, Möglichkeiten und Grenzen der Nutzerintegration in der Produktentwicklung, Available: http://opus.kobv.de/tuberlin/volltexte/2004/779/ [15 September 2009].

von Hippel, E. 1998, "Economics of Product Development by Users: The Impact of "Sticky" Local Information", Management Science, vol. 44, no 5, pp. 629-644.