

Analysing the usefulness of Strategic Niche Management on the cases Agromere and AlgaePARC

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1. Introduction

Sustainable development seems to require innovation scholars to acknowledge the wider importance of sustainability transitions (Smith et al., 2010). In that respect we applied Strategic Niche Management (SNM) in a Multi-level perspective (MLP) to the innovation projects Agromere and AlgaePARC, with the aim to promote multi-stakeholder innovations, by providing recommendations for intermediary actors (cf. Geels and Deuten 2006). Taking the perspective of the intermediary, we found that further conceptual developments regarding SNM/MLP are required. This extended abstract introduces briefly the different concepts, the two cases, their analysis, the discussion and the conclusions.

Literature

Strategic niche management (SNM) may be considered as a tool that supports the introduction of sustainable innovations (Raven, 2005) that emphasizes steering of the group of relevant actors (Geels and Schot, 2007). Sustainable innovation trajectories can be facilitated by creating so-called niches. Niches are circumscribed as "protective space" where actors can nurture radical novelties in an environment where selection pressure is avoided (Geels and Schot, 2007; Grin et al., 2010; Smith and Raven, 2012). The assumption is that properly constructed niches act as building blocks for broader societal changes towards sustainable development (Schot and Geels, 2008). Seyfang and Smith (2007) distinguished two types of niche innovations: market based and grassroots. They argued that market based innovations differ from grassroots innovations in context (market vs social economy), driving force (profit vs social need), niche (market rules vs values), organisational form (firm vs diversity of organisations) and resources (commercial oriented vs diverse non-profit funding). SNM scholars (see Van der Laak et al., 2007); Grin et al., 2010) provide a useful framework to analyse the development of niches following three key processes:

- Visioning: Voicing and shaping of expectations;
- Networking: Building broad social networks;
- Learning: Reflective learning process leading to second order learning.

SNM can be applied in a multilevel perspective (MLP) that distinguishes three sociotechnical levels, namely Landscape level, Regime level and Niches (Geels, 2002).

The core of MLP is the interaction between landscape, regimes and niches, and the way top-down landscape pressure and bottom-up niche development influences the evolution of sociotechnical regimes (Grin et al., 2010).

Finally, we refer to the concept of intermediary actors, such as professional societies, standardisation organisations, or research institutes. On the one hand, such actors can perform aggregation activities (standardisation, model building, writing of handbooks) for the production of a collective good (Geels and Deuten, 2006). On the other hand, an intermediary actor may act as business developer, or even network orchestrator. This actor may promote multi-stakeholder innovations, by means of innovation initiation, network formation, and/or innovation process management (Batterink et al., 2010).

Case studies

This section briefly introduces two cases of multi-stakeholder innovation projects, named Agromere and AlgaePARC. The two cases were selected in a series of meetings, because both cases relate to so-called multi-actor or collective actions, allow the study of the intermediary actor, had one author aboard introducing related tacit knowledge, and were suited to be interpreted with SNM, while taking divergent positions on other key innovation variables. Agromere concerns the introduction of urban agriculture in the new city area Almere Oosterwold, next to Almere (app. 190.000 inhabitants, 30 km east of Amsterdam). It could be categorized as a more grassroots niche innovation because it is emphatically driven by values, social economy, local organisations, and social needs. AlgaePARC concerns the establishment of a technical innovation program for the development of new commercial algae products and processes. It could be categorized as a market based innovation, because AlgaePARC is a market driven niche innovation within the agrifood, energy and chemical sector (Sastre, 2012). Wageningen UR was the key intermediary actor in both of the investigated cases.

Case Agromere

The overarching aim of Agromere was to explore how to bridge the traditional boundaries between urban life and agriculture. Agromere was executed by Wageningen UR, over a period of 6 years (2004-2010) as a research and design arena in which stakeholder management (see Freeman et al. , 2010) proved to be essential (Jansma and Veen, 2014). It successfully influenced Almere and its regional partners to include urban agriculture in the city's development plans of the new area Almere Oosterwold. (Almere, 2009 and Almere, 2012).

Case AlgaePARC

The second case concerns the development of AlgaePARC, established with no less than 19 companies by 2011. AlgaePARC is an innovation program of Wageningen UR where R&D programs run with the goal to develop cost-effective and sustainable microalgae production methods outdoors (Barbosa, 2011). Categorical lowering of the algae unit price makes commercial biochemicals and biofuels feasible (Sastre, 2012). It requires a leap in microalgae technology: "the scale of production needs to increase at least 3 orders of magnitude, with a concomitant decrease in the cost of production by a factor of 10." (Wijffels et al. 2010: 797) A wide range of companies (national/international, SME/Multinational, Food/Feed/Chemical/Fuel) was looking for an R&D partner to develop the technologies to match these requirements. Wageningen UR was able to form the

consortium and create AlgaePARC. It should fill the gap between fundamental research and full-scale algae production facilities within the next 10-15 years.

Case analysis

This section applies the stated three key processes to analyse both cases in a MLP perspective. Although these steps are interpreted and described subsequently, we consider them to develop in reality less separate, more iterative.

Agromere

Agromere may be considered a niche related to two incumbent regimes: the Dutch spatial planning regime, and the Dutch food regime (Jansma et al., 2014). Both regimes are under pressure from changes at landscape-level, due to, among others, the 2008-global financial crisis, climate concerns, and concerns about food security, leaving ample space for the urban agriculture niche (Jansma et al., 2014).

Visioning. Early on, Wageningen UR introduced the so-called future scenarios approach to broaden the perspective of local stakeholders (Visser et al., 2009). Thinking of the future is all about the next generations that stimulated the participants to put aside their current interests and stakes, since these are typically coupled to today's reality. Moreover, the joint development of future scenarios stimulated stakeholders to search for common ground, to provide space to manoeuvre, and to develop a shared vision about what urban agriculture in Almere should look like (Visser et al., 2009).

Networking. Establishing this shared vision supported the development of a network of committed stakeholders within the Almere Oosterwold area. Wageningen UR used the stakeholder approach to analyse and manage the heterogeneous stakeholders in the Agromere Arena during the Agromere project and thus to adequately act, intervene and broker between different (actor-)networks (Jansma and Visser, 2011)

Learning. Through visioning, networking and stakeholder interventions Wageningen UR aimed at developing common knowledge on urban agriculture in the Almere context. It is said that broad networks containing outsiders provoke more second-order learning than small networks with merely insiders. The multidisciplinary character of the interactions in the Agromere project, with different values, angles and solutions, created this common knowledge on urban agriculture.

AlgaePARC

The first of three important pressures from landscape level on the regimes for microalgae innovation projects is scarcity and security of energy supply, leading to a search for alternative energy sources (Bos et al., 2008). Another pressure is climate change and the commitment of many governments to reduce CO₂ emissions (Bos et al., 2008): Using algae as an alternative resource for non-food applications probably emits less carbon dioxide than alternative sources (Wijffels et al., 2010). The last important pressure is the anticipated shortage of proteins: Microalgae are interesting sources for food and feed applications (Sastre, 2012).

At the level of regimes three dominant incumbent regimes can be distinguished, namely the agrifood regime, the chemical regime (Bos et al., 2008), and the fuel industry. Microalgae are a promising feedstock for biodiesel (Wijffels et al. 2010). Because of the

increase of energy demand and decrease of easy accessible fossil resources, various oil companies are looking at microalgae as an interesting feedstock for biofuels.

Visioning. Between 2008 and 2011, Wageningen UR guided an iterative process to develop a shared vision of the consortium on the optimisation of microalgae production. To manage the expectations this vision together with a project plan was written down by Wageningen UR and formed the basis of the stated consortium agreement.

Networking. In 2008 Wageningen UR started to develop an international network on microalgae production optimisation, involving multi-stakeholder representatives. It regularly organized meetings to stimulate alignment of interests. By 2011, the efforts resulted in an consortium-agreement signed by national and regional authorities, Wageningen UR, and 19 companies (multinational/SME) from such diverse industries as Food, Feed, Agriculture, Fuel, Chemicals, and Energy. Thus, representatives of all dominant regimes became part of the consortium.

Learning. By bringing together partners with divergent knowledge on microalgae, the knowledge exchange between the representatives provided a common knowledge base. The second part of the learning process started with signing the consortium agreement which also involved a R&D-project: AlgaePARC initiated diverse experiments (various designs) in different dimensions (technology, sustainability & regulations), with regular meetings with all the partners.

Discussion and conclusions

SNM in a MLP perspective provided the researchers with a useful frame to (ex post) analyse the development of the innovation projects Agromere and AlgaePARC, but SNM/MLP lacked some critical dimensions when turning to recommendations for intermediary actors. For example, for visioning and networking the stakeholder approach was supportive in the Agromere project to explore and understand the stakeholders, their environment and the networks in which they operate. Hence, it helped to attune the evolving concept urban agriculture to the stakeholders' interests. In the AlgaePARC case, Wageningen UR started as business developer, that initiated the innovation, and formed the research network. It realised innovation process management when it became the core research institute after the establishment of AlgaePARC. In line with the definition by Batterink et al. (2010) we found in both cases that the intermediary actor Wageningen UR executed critical roles regarding innovation initiation, network formation, and facilitating of the innovation process .

Nevertheless, SNM in a MLP perspective doesn't provide us with (sufficient) tools for the intermediary actor to guide the maturing of both niches. First we arrive at different recommendations for grassroots and market-based niche innovations. In the Agromere, we experience a missing link in realizing the leap from grassroots niche innovation toward mainstream (regime) in urban agriculture. Social Practice Theory could shed light on the embedding of grassroots innovations, because it focusses on transitions in everyday practices which shape the regime (Shove and Walker, 2010). Analysing critical points of intersection between niche innovations and every day practices at regime level could be helpful to expand the Agromere urban agriculture-project from niche to mainstream (Hargreaves et al., 2013). Especially the market-based niche project AlgaePARC, requires technological breakthroughs to enable the evolution from market niche toward full scale production. The concepts (SNM, MLP, SPT) do not allow for an in

depth technology assessment, an essential pillar in technologically advanced niche projects.

Secondly, for both cases it should be recognized that the SNM has shortcomings when it concerns assessing *ex ante* the economic potential of niche innovations. Both cases are in need of an economic pillar in SNM. For example, the financial dimension was critical in organizing and realizing AlgaePARC. The detailing of recommendations is still under research.

References

- Almere, 2009. Concept Structuurvisie Almere 2.0 (Draft Strategic Vision Almere 2.0). Stuurgroep Almere 2030, Almere, June 2009. 309 pp. (In Dutch. Summary in English).
- Almere, 2012. Almere Oosterwold; Land-goed voor initiatieven (Development Strategy of Almere Oosterwold), March 2012. Rijks-regioprogramma, Amsterdam-Almere-Markermeer (RRAAM), Almere 2.0, IAK gebied Almere Oosterwold, Gemeente Almere. 280 pp. (in Dutch)
- Barbosa, M., R. Bosma, D.M.M. Kleinegris and R.H. Wijffels, 2011. AlgaePARC: Facing the challenges of microalgae mass production. *European journal of phycology*, volume 46: 26 -26
- Batterink, M.H., E.F.M. Wubben, L.Klerkx, and S.W.F. Omta, 2010. Orchestrating innovation networks: the case of innovation brokers in the agri-food sector. *Entrepreneurship & Regional Development* 22 (2010) 47-76.
- Bos, H.L., M.A. Slingerland, W. Elbersen and R. Rabbinge, 2008. Beyond agrification: twenty five years of policy and innovation for non-food application of renewable resources in The Netherlands. *Biofuels, Bioprod. Bioref.* 2, 343-357.
- Freeman, R.E., J.S. Harrison, A.C. Wicks, B.L. Parmar and S. de Colle, 2010. *Stakeholder Theory; the state of the art*. Cambridge University Press, Cambridge, UK. 343 pp.
- Geels, F.W., 2002. Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. *Research Policy* 31 (2002) 1257–1274.
- Geels, F.W. and J. Schot, 2007. Typology of socio-technical transitions pathways. *Research Policy* 36 (2007): 399–417.
- Grin, J., J. Rotmans and J. Schot, 2010. *Transitions to sustainable development: New directions in the study of long term transformative change*. Routledge Studies in Sustainable Transitions, Taylor and Francis group, London UK. 397 pp.
- Hargreaves, T., N. Longhurst and G. Seyfang, 2013. Up, down, round and round: connecting regimes and practices in innovations for sustainability. *Environment and Planning A* 2013, volume 45: 402-420.
- Jansma, J.E. and A.J. Visser, 2011. Agromere: Integrating urban agriculture in the development of the city of Almere. *Urban Agriculture Magazine* 25 (2011): 28–31.
- Jansma, J.E. and E.J. Veen, 2014. The Agromere Arena: A process review on bridging the boundaries between the Dutch city of Almere and urban agriculture. In: *Regional transitions in food provision, agriculture and tourism; tracing processes underlying drama, choice making and communication*; S. Vellema and C. de Lauwere (eds), Wageningen Academic Publishers, Wageningen (Forthcoming).
- Jansma, J.E., E.J. Veen, A.J. Visser and A. van der Valk, 2014. Almere Oosterwold: developing urban agriculture, a challenge to spatial planning. *Proceedings of AESOP annual conference 2014, 9-12 July, Utrecht Delft, The Netherlands* (Forthcoming).
- Van der Laak, W., R.P.J.M. Raven and G.P.J. Verbong, 2007. Strategic niche management for biofuels: Analysing past experiments for developing new biofuel policies. *Energy Policy* 35: 3213-3225.
- Raven, R.P.J.M., 2005. *Strategic Niche Management for Biomass: a comparative study on the experimental introduction of bioenergy technologies in the Netherlands and Denmark*. PhD Thesis, Technical University of Eindhoven, The Netherlands (2005).
- Raven, R., J. Schot and F. Berhout, 2012. Space and scale in socio-technical transitions. *Environmental Innovation and Societal Transitions* 4 (2012): 63–78.
- Sastre, R.R., 2012. Products from microalgae: An overview, in Posten, C. et al. (Eds.), *Microalgal Biotechnology: Integration and Economy*. De Gruyter, Berlin, Chapter 2, pp 15-50.
- Seyfang, G. and A. Smith, 2007. Grassroots innovations for sustainable development: Towards a new research and policy agenda. *Environmental Politics* 16:4, 584–603.
- Schot, J. and F.W. Geels, 2008. Strategic Niche Management and sustainable innovation journeys; theory, findings, research agenda, and policy. *Technology Analysis & Strategic Management*, Volume 20, No. 5: 537-554.
- Shove, E. and G. Walker, 2010. Governing transitions in the sustainability of everyday life. *Research Policy* 39 (2010): 471–476
- Smith, A. and R. Raven, 2012. What is protective space? Reconsidering niches in transitions tot sustainability. *Research Policy* 41 (2012): 1025-1036.
- Visser, A.J., J.E. Jansma, H. Schoorlemmer and M.J. Slingerland, 2009. How to deal with competing claims in peri-urban design and development: The DEED framework in the Agromere project, p 239–252. In: *Transitions towards*

sustainable agriculture and food chains in peri-urban areas: Poppe K. J., Termeer, C. and Slingerland M.A. (eds) Wageningen Academic Publishers, Wageningen. 392 pp.

Wijffels, R.H. and M.J. Barbosa, 2010. An Outlook on Microalgal Biofuels. *Science* 329, 796-799.