

TECHNOLOGY AND KNOWLEDGE IN NEW CONTEXTS: HETEROGENEOUS NETWORKS IN THE REFURBISHMENT SECTOR IN AUSTRIA

Michael Ornetzeder
Centre for Social Innovation (ZSI)
Linke Wienzeile 246
A-1150 Vienna, Austria
Tel.: ++43 1 4950442-54
Fax: ++43 316 4950442-40
email: ornetzeder@zsi.at

Jürgen Suschek-Berger
Inter-University Research Centre for Technology, Work and Culture (IFZ)
Schlögelgasse 2
A-8010 Graz, Austria
Tel.: ++43 316 81 39 09 - 31
Fax: ++43 316 81 02 74
email: suschek@ifz.tugraz.at

Paper prepared for the INNOVATION PRESSURE Conference
15th - 17th March 2006, Tampere, Finland

Abstract: *In Austria the highest potential for sustainable refurbishment is within the sector of single family houses, built between 1945 and 1980. According to estimates, two-thirds of all possible investments can be assigned to this category. However, there are only a few successful models on the supply side, which combine efficient information and mobilisation of users with a comprehensive technical and ecological offer.*

Two of these rare examples will be discussed in this paper. Both models have been operating successfully at a local level for the promotion of sustainable refurbishment for several years. The studied examples are characterised by network structures constituted by heterogeneous local social players, aiming at quality assurance to enable attractive offers for homeowners. Centrally co-ordinated units manage both network models. In addition to the management of networks, these units are responsible for several other functions: Public relations, training seminars, strategic development, advisory services for end users, and the implementing of refurbishment measures.

Based on a comprehensive analysis and documentation of both models, we will present a critical evaluation of the network activities. The focus will be on the network structure and their necessary functions.

1 Introduction

Habitation is without doubt one of the key areas for sustainable development. The construction of residential buildings and necessary infrastructure requires land area, energy, and an enormous amount of building material. In modern societies more than one third of the overall energy consumption is used to serve heating and warm water needs. Along with traffic and industry, habitation is responsible for a considerable share of CO₂ emissions.

Concerning the construction of new houses major advances towards sustainability have been achieved in the last 20 years. In Austria most new houses feature low energy standards. Moreover, we can see a trend to reduce land use by developing high-density areas. However, the highest ecological potential for improvement is found in the existing building stock.

According to a study on refurbishment measures for residential buildings in Austria (Schuster 2000) the largest reduction of energy needs could be achieved in private homes constructed in the period between 1945 and 1980. Approximately 700,000 private houses should be considered for ecological improvements.

In private households, refurbishment is still dominated by single-step procedures, a strategy oriented toward household finances, insufficient subsidy schemes, and the urgency to carry out repairs promptly. In rural areas the tradition is to do repairs in one's own house or in co-operation with semi-professional craftsmen. These are conditions that considerably hinder the realisation of comprehensive and ecologically effective refurbishment concepts.

Problems can also be found on the supply-side. Most construction companies lack specific know-how to offer ecologically up-to-date refurbishment solutions. Therefore locally based company networks that co-operate with different resources and skills are often seen as a solution to this problem.

Two examples of these rare networks have been analysed in a project within the framework of the Austrian research programme "Building of Tomorrow". Both selected cases focus on sustainable refurbishment in the private sector and have been active for several years in two different Austrian regions: the 'Öko-Modell im Alt- und Neubau' (Eco-model) in the province of Tyrol and the network 'Traumhaus Althaus' (Old Dream House) in the province of Vorarlberg. The results of our empirical research are based on 20 qualitative interviews with experts inside and outside the networks, a written survey on network customers, and extensive document analysis. The aim of this study was to understand how these initiatives work, to discuss options for improvement and to establish similar initiatives in other regions.

In this paper, which is based on the results of the mentioned project, we will give a short description of the studied networks and then will compare both cases and discuss some key functions on a more general level. There the focus is on possibilities and limitations of networks to shape and stimulate innovation. Before going into empirical details, we will refer briefly to the theoretical discussion on innovation networks.

2 Innovation Networks and Sustainability

The emergence of new forms of co-operation, located between the principles of 'market' and 'hierarchy', has not only been widely discussed in politics and the public in the last 10 to 15 years. Driven by empirical evidence, the topic has gained in importance in the social sciences, as well, and a number of theoretical concepts have been developed in order to describe and understand these new phenomena. Most concepts refer to social networks and clusters. Clusters are often studied from an economic perspective. The most important theoretical argument is that clusters have the potential to affect competition by increasing the productivity of companies in the cluster, by driving innovation, and by stimulating new businesses in the field (Porter 1980).

Social networks are discussed also in the context of sustainable development as a promising solution. Networks are seen as qualified institutions or new forms of governance to promote normative objectives of sustainability. From this point of view networks mobilise the potential for self-organisation, bring together social players otherwise separated by traditional institutions, or help to create a 'milieu innovateur'. Majer (2005) argues that sustainable development is not only a guiding vision but closely connected to the implementation of new governance structures such as social networks. In a similar way Minsch (undated) stresses the importance of new forms of co-operation for sustainability, which could not succeed without a broad mobilisation of creative problem-solving potentials.

But what is a social network? How can we define this concept? Generally speaking social networks are loosely coupled individual or organisational systems of action. They are characterised by a common purpose, by the logic of communication and negotiation, and by minimal internal institutional structures. Network members co-operate on a voluntary basis, because the positive effects are considered to be higher than the costs involved (Fürst 2002).

Social capital (Coleman 1988, Putman 1993) is considered to be one of the basic principles for interaction in networks. Social capital results from communication, discussions on professional knowledge and values, and the willingness to co-operate. It relies on trust, which serves as a basis for the development of co-operation and mutual support.

Social networks operate with paradigmatic forms of governance much more than traditional institutions, which mean they try to influence social action by forming opinions. Paradigmatic governance can be used in networks because it is assumed that the recipients trust the sender. Recipients as partners in networks are open for advice (Fürst 2002).

In our context, company networks with a common focus on innovation are of particular importance. Küppers and Pyka (2002) define such innovation networks as interaction processes between a set of heterogeneous players producing innovation at different geographical levels. Innovation networks are co-operative relationships aiming at invention, development and successful implementation of products and processes. In our case studies local networks in the building industry try to develop comprehensive offers for homeowners. The innovation is not a single product but rather a combination of ecological advisory services, planning, and the application of various new refurbishment technologies.

Why should companies join innovation networks? The most common argument refers to advantages in competition. Innovation networks are seen as a strategy for success, even under problematic conditions. Küppers (2002) argues that innovations are becoming increasingly more complex and, at the same time, a product has to fulfil the potential user's specific requirements. Innovations must not only function technologically and be economically viable, but also has to fit into the socio-political environment. Therefore single companies alone are not able to summon up enough intellectual, social and material resources to be successful. Innovation networks could work as a medium through which material and symbolic resources are mobilised and combined (Perry 1993). Through network interaction permanent processes of changing, searching, and learning could be stimulated, helping to improve the market position of network partners (Hellmer et al. 2002). Moreover, innovation networks could reduce different kinds of uncertainties in the innovation process if the network partners' various competencies are successfully integrated (Küppers 2002). Summarizing it can be stated that from a theoretical perspective social networks are considered to be powerful sources of innovation – at least under specific conditions.

As empirical case studies show, in practical experience, ideal-type outcomes are seldom achieved. In a comprehensive German study the authors conclude, that the effects of innovation networks are marginal in comparison to the potentials of markets and hierarchy. In particular this is true for SMEs, a sector still characterised by distinctive competitiveness which considerably hinders new forms of co-operation (Hellmer et al. 2002). The importance of regulatory and policy frameworks for the success of technical innovations – even when they have been produced in innovation networks – is demonstrated in a case study on combined heat and power technology (CHP) in Europe (Weber 2002). It seems that under real conditions innovation networks are confronted with a number of internal and external problems.

3 Case Studies

Comprehensive ecologically-effective refurbishment of the building stock is one of the key strategies to reduce CO₂ emissions distinctly. While in the last years this potential has been developed quite successfully for multi-floor buildings – refurbishment projects are planned and organised by large housing companies – the situation in the private home sector is still problematic.

In order to stimulate innovation on the supply side, two network activities were started in the provinces of Vorarlberg and the Tyrol – although very close in geographical terms, they are completely independent of each other. Both networks aim at improving offers for private customers. Improvement means that homeowners planning to modernise their houses should be able to get up-to-date information on ecological refurbishment. The core idea of these consultations is to promote comprehensive refurbishment concepts, which are able to save energy and maximise the ecological effect. The implementation of single measures showing only little ecological effects and often resulting in additional repairs within a few years should be avoided. Both initiatives focus on private homeowners, which represent the largest market for building companies in these regions. The co-operation in local networks should improve the technical know-how and practical skills and promote joint projects.

Case study 1: Öko-Modell im Alt- und Neubau (Eco Model for Old and New Buildings)

The Tyrolean based network 'Öko-Modell im Alt- und Neubau' is managed by a private association called 'Network for Nature/Environment & Economy'. The main mission of this initiative is to offer advice for private homeowners on questions of energy and to support decisions and the implementation of measures. The advisory service is organised by two regional centres. The advice is given by specially trained experts working for the network on a freelance basis. Most network activities are financed by a membership fee. At present about 30 local companies and institutions are network members – not only representatives of the construction sector but also two banks, and a few communities. The network membership and co-operation within the network is fixed by a written agreement to be confirmed year by year. Customers who are interested in the network's energy advice services can order a voucher from one of the network companies. In return network companies are able to make contact with potential customers. Basic advice is given for free, all additional information and instruction have to be paid for. The network has been in existence since 1997 and was started in one of the Tyrolean districts. At the very beginning it was a school project focusing on energy issues. Later the company network expanded. In the first years the activities were concentrated on retrofits and the dissemination of sustainable energy technology (such as solar collectors or biomass heating systems) only. Later on activities expanded to the planning and construction of new buildings.

Case study 2: Traumhaus Althaus (Old Dream House)

The network 'Traumhaus Althaus' was established in the year 2000. At present about 60 building trade companies are network partners. At the beginning this figure was much higher, originally starting with more than 160 members. The network was established by the 'Energieinstitut Vorarlberg' (Energy Institute of Vorarlberg), a consulting and research institute sponsored by the local government. The network activities aim at members – the management offers a variety of services – as well as at private homeowners. Within the network the main focus is on know-how transfer and on quality control. Network members should be able to carry out comprehensive refurbishment projects with high ecological standards. Therefore network members have to abide by a special codex, regarding technical and procedural rules. At least one employee of each network company has to be qualified as an energy expert. Moreover, these experts have to participate in additional training-programmes and should spread their know-how within their own company. Network members have to pay a yearly fee (between 900 and 2100 Euro, depending on the number of employees). In addition to the training programmes and quality control activities, the network management is responsible for a common marketing strategy.

Table 1: Common and different network features

Common features	Short description	
General goals	<ul style="list-style-type: none"> • Implementation of comprehensive ecological retrofit innovations • Focus on private homes • Innovations through co-operation in local networks 	
Training focus	<ul style="list-style-type: none"> • Technology and practical skills for energy saving retrofit measures 	
Organisation	<ul style="list-style-type: none"> • Strategic networks with limited membership (to be renewed annually) • Co-operation with autonomous companies, partly with overlapping interests • Strong management 	
Differences	Öko-Modell	Traumhaus Althaus
Starting point	Energy advice for private households	Know-how transfer to the building industry
Contact to customers	Direct contact through energy consultancy	Public relations
Core competence of the network management	Networking and energy consultancy	Research, energy consultancy, education and training
Size	About 30 network partners	About 60 partners (started with 160)
Membership structure	Heterogeneous	Branch specific
Commitments	Informal	More formal (contract and codex)
Financing	Membership fees, earnings from comprehensive consultancies, project money	Subsidies from the local government, membership fees

4 Analysis of Central Functions

In order to meet the self-assigned goals, the innovation networks must serve various functions. The network management has to coordinate the strategic development and is responsible for the internal flow of information. Moreover, the management organises internal training seminars and supports the communication with customers (through consulting and/or public relations). All these activities aim at the development and implementation of ecologically-effective retrofit projects. In the following paragraphs we will describe and analyse these main network functions in detail.

Strategic development

Dealing with strategic questions is of decisive importance for the development of innovation networks. In these cases questions could refer to technical aspects (“How do we define ecological refurbishment?”) as well as the coordination of different tasks (“How could we combine information campaigns, consultation services, training seminars etc. with an effective strategy?”). Strategic decisions should also guarantee good financial management and public relations resources.

In both cases the management is mainly responsible for the strategic network development. In the case of ‘Traumhaus Althaus’ strategic decisions are discussed in a steering group consisting of company representatives chaired by the responsible management project leader. For basic decisions the main sponsor of the network activities, the government of Vorarlberg, must be consulted. In the Tyrolean case, first of all, the association ‘Network for Nature/Environment & Economy’ is concerned

with the development of strategies. However, the network's energy and building consultants – a core group of about five persons – are closely involved in all strategic discussions as well. After consulting this core group, the annual working programme is presented and discussed at a meeting with the network companies. In contrast to the situation in Vorarlberg, the strategic development of the network 'Öko-Modell im Alt- und Neubau' is not institutionally linked to the local government's housing department.

Network management

Network management includes the administration as well as the support of network members, the exchange of information, but also the handling of financial and contractual concerns.

In the network 'Traumhaus Althaus' management tasks are operated by the responsible project group at the Energy Institute of Vorarlberg. The activities are financed by governmental funds as well as membership fees. In Tyrol the network is divided into two independent regional networks, which are managed by separate offices. Due to a much smaller number of members in 'Öko-Modell im Alt- und Neubau' the office representatives are able to contact each member personally at least once a year. Although managements in both cases are very active, both networks are confronted with decreasing numbers of members.

Internal Qualification and Training

The network partners' internal qualification refers, first of all, to theoretical as well as practical know-how, which is necessary for implementing up-to-date ecological retrofits. In both cases qualification training is organised by the management.

This aspect is of major importance in the 'Traumhaus Althaus' network. The network management has easy access to the professional and personal resources of the Energy Institute, which is complemented by external experts if necessary. The qualification training is offered four days per year. Each network partner should attend at least two training days. In interviews, participants report unanimously about the high quality of these training programmes. For many companies the access to this kind of knowledge was one of the reasons for joining the network.

In the second case internal qualification does not play such a major role. In fact there is a training programme for companies but it takes place only once a year.

In spite of the differences in the two cases it appears difficult to offer attractive training programmes for a longer period of time due to problems involved in designing 'one-size-fits-all' seminars in heterogeneous networks.

Public Relations

Both network managements run public relations. These activities include the information for the general public about the network activities as well as the attempt to set up trademarks for the networks. In the case of 'Öko-Modell im Alt- und Neubau', which is more customer orientated, the information aspect is of major importance. The network management tries to inform the homeowners by means of advertisements in local newspapers and other promotional material. Homeowners should recognise and make use of the range of network services. Establishing a brand or promoting network partners is of less importance in the Tyrol.

With 'Traumhaus Althaus' the main focus is on brand development. In the first two years the management had launched several advertising campaigns throughout the

province. The trademark 'Traumhaus Althaus' was supposed to become well known in Vorarlberg. As the results of the customer survey show, this strategy did in fact lead to larger amount of public awareness – compared to the 'Öko-Modell' in the Tyrol – but the goal to establish 'Traumhaus Althaus' as a quality label has not yet been accomplished. It is also obvious that only a small number of network members use the 'Traumhaus Althaus' promotional material. Their own original corporate logo is of much greater relevance.

As a consequence, the capability of the network's public relations to acquire new customers is very limited.

Advice on Energy Use and Technology

Consultancy for private homeowners is an integrated part of the network activities only in the 'Öko-Modell im Alt- und Neubau' network. Free initial consultations are financed by the membership fees paid by all participating companies. In Vorarlberg advice is given by a group of experts sponsored by the local government. The 'Traumhaus Althaus' management is in contact with this consultancy group but there is no direct link to the network activities.

In both provinces the advising services have a very good reputation in the public opinion. The information given is good in content and classified as neutral in respect to companies and products.

Implementing Refurbishment Projects

Both networks are only indirectly involved in refurbishment projects. Contractors are network companies or project-based network partner co-operations.

Although many homeowners use the advising services, the dissemination of comprehensive ecological retrofits is still extremely limited. Therefore co-operations between network members are more of an exception than the rule. One of the central goals of the network activities – to push ahead with innovation in refurbishment projects – has not yet been achieved.

A long tradition in the construction sector is to form project-based co-operations with complementary trades. These co-operations are often based purely on mutual trust and stabilized by ongoing co-operations. Unfortunately, the studied networks have not stimulated project-based co-operations such as these so far.

The practical impact of the network activities on innovation is rather qualitative than quantitative, i.e. the networks' improved offers have not stimulated as many projects as expected, but the technical quality and the scope of single projects have improved.

The following table gives an overview of central functions of the studied networks and characterises these functions by main tasks.

Table 2: Central functions and related tasks in refurbishment networks

Functions	Tasks
Strategic development	<ul style="list-style-type: none"> • Formulation of technological guidelines on refurbishment quality standards • Co-ordination of different sub-strategies (information campaigns, advice services, training seminars etc.) • Network set-up and development • Guarantee of financial resources (subsidies, fees, fundraising)
Network management	<ul style="list-style-type: none"> • Administration of contracts • Support and attendance of network members • Supply and allocation of information
Qualification and training	<ul style="list-style-type: none"> • Development of training seminars for network partners • Quality assurance • Training seminars for advisers (eco-model only)
Public relations	<ul style="list-style-type: none"> • Ecological refurbishment fairs • Production of promotion material • Information campaigns, advertisements in local newspapers • Trademark promotion
Advising services (eco-model only)	<ul style="list-style-type: none"> • General advice (focus refurbishment) • Customised advisory service • Energy- and refurbishment concepts • Monitoring
Implementation of refurbishment projects	<ul style="list-style-type: none"> • Tender and planning • Implementation • Site inspection

5 Discussion

The studied refurbishment initiatives are heterogeneous innovation networks, thematically as well as organisationally controlled by central management units. Although important decisions are made in co-ordination with most network partners, self-organised communication between company partners is rare. Social capital as a principle for interaction is not developed and therefore not relevant so far. In the building industry social capital is based mainly on positive joint-project experiences. Company representative 'get-togethers' in training seminars have a positive effect but are much too seldom to establish stable and trustful connections. There appears to be a correlation between the size of networks and the opportunity to set up social capital. With the increase in size it is more difficult to establish trustful relations. Another problem with size is the membership structure. It is obvious that networks consisting partially of direct competitors are at a disadvantage regarding trust and co-operation.

As we could see in our examples the networks have to cover a wide range of partially very different functions. This variety could also act as an indicator for the complexity of innovations in the field of sustainable refurbishment. This is not about the development of a new product and its successful market-launch, rather the networks have to create several sets of services and products based on new knowledge, skills and technology, which can take specific shapes at the project level.

A feature of both networks is that the innovation focus has been fixed from the outset – sustainable refurbishment. Perhaps this precondition may explain the dominant role of the management units. It is likely that self-organised company networks are more open and more market-orientated. It seems that the core competence of the management shows far-reaching effects on the nature of networks. In both cases the technical know-how on energy issues and sustainable refurbishment of the initiators was of major importance.

The transfer of knowledge and skills is clearly the main characteristic of both networks. In the 'Öko-Modell' homeowners are provided with comprehensive up-to-date refurbishment information. The 'Traumhaus Althaus' network is very good at qualifying and training. However, the combination of internal qualification and networking demonstrates some problems, as well. The size of the network is in structural conflict with the thematic alignment. The more different interests are to be considered, the wider and therefore more time-consuming and expensive the programme development is. It also appears to be very difficult to offer a relevant and interesting qualification programme over a longer period.

Setting up innovation networks does not necessarily lead to market relevant innovations – of course this is not only true for our cases. In terms of market success, the impact of the studied networks is still minor. Although the situation on the supply side has improved considerably, the possibilities of networks to influence the demand is obviously limited. For example, the necessary resources to launch and sustain a new trademark and to inform the public continually about the network activities, is far beyond the network's means. In both examples the management tries to close the gap between market (customers) and hierarchy (politics); the impact especially on the regulatory framework (subsidies) – which is crucial for the market success of comprehensive retrofit concepts – is not strong enough. The underdeveloped market is also responsible for the small number of newly created co-operations on the project level. However, co-operations of complementary trades on a very local level would be necessary to cope with comprehensive retrofit jobs in the future.

6 Summary and Conclusions

In this paper we have presented two case studies on innovation networks in the field of sustainable refurbishment. From an ecological perspective, modernisation of private houses offers a large potential to reduce CO₂ emissions through energy savings. Innovation networks should therefore close the existing gap between demand and supply by improving the technical offer as well as by stimulating the demand.

From a theoretical view, innovation networks are seen as a strategy to cope with these challenges. In innovation networks, material and symbolic resources can be mobilised and combined. Through interaction within networks, processes of changing, searching, and learning can be stimulated, reducing uncertainties in the innovation process and helping to improve the market position of network partners. If specific conditions are fulfilled, social networks are considered as powerful sources of innovation. However empirical studies show that under real conditions innovation networks are confronted with a number of internal and external problems.

Both of the presented innovation networks focus on sustainable refurbishment in the private sector and both have been active in two different Austrian regions, trying to promote and support innovations for sustainable refurbishment on the local level for

several years. Although very close in geographical terms, both initiatives were developed independently of each other. In spite of this, we found many similarities. In both cases the network activities are co-ordinated by central units. In addition to network management tasks, these units are also responsible for several other functions: Public relations, training seminars, strategic development, advisory services for end users, and the implementing of refurbishment measures. The necessity to cover such a wide range of different functions is an indication of the complexity of innovations in the field of sustainable refurbishment.

Both networks are driven by the idea of changing practices in the building industry towards more sustainability. This goal was fixed from the outset and is closely linked to the initiator's core competence. It seems that these core competences show strong effects on the development of the networks. Therefore it is not surprising that transfer of knowledge and skills is one of the strengths in both cases.

Learning together about sustainable technology and practical skills does not lead to the development of sufficient social capital. Moreover it seems problematic, if direct competitors participate in one and the same network. In order to establish trustful relations, project-based experiences of mutual co-operations are of vital importance.

As our case studies show, setting up innovation networks does not necessarily lead to market relevant innovations. There are limitations on both sides. On the one hand, the influence on the performance and strategies of members – concerning skills, knowledge and offered products – is limited. On the other hand, these networks are not able to open up the market for sustainable refurbishment. Resources for public relations are not sufficient. In order to increase the demand for sustainable refurbishment, changes are needed, above all, in the regulatory framework.

Acknowledgements

We are grateful to the 'Ministry for Traffic, Innovation and Technology' (BMVIT) for funding our research and to the 'Austrian Society for Environment and Technology' (OGUT) for managing the programme 'Building of Tomorrow'.

References

- Coleman, J., 1988. Social Capital in the Creation of Human Capital. *American Journal of Sociology* 94, Supplement, 95-120.
- Fürst, D., 2001. Die Bedeutung von Netzwerken in modernen Gesellschaften. In: Kanning, H., I.c., 5-15.
- Hellmer, F., Friese, Chr., Kroll, H., Krumbein, H., 1999. Mythos Netzwerke - Regionale Innovationsprozesse zwischen Kontinuität und Wandel. Edition sigma, Berlin
- Kanning, H. (Ed.), 2001. Netzwerke und Nachhaltigkeit: Vernetzte Probleme – vernetztes Denken – vernetzte Lösungen. Schriftenreihe des Doktoranden-Netzwerkes Nachhaltiges Wirtschaften e.V. Band 6, Hannover.
- Mair, G., 1997. „Öko-Modell Außerfern“. In: Amt der Tiroler Landesregierung (Ed.), *Netzwerk Zeitung*, Nr. 9, Innsbruck, Juni, 10-13.

- Majer, H., 2005. Institutionelle Innovationen für Nachhaltigkeit [Web Page]. (Accessed 5. Feb. 2006). Available at: <<http://www.nachhaltigkeit.at/reportagen.php3?id=9#K8>>
- Minsch, J., undated. Gedanken zu einer politischen Kultur der Nachhaltigkeit [Web Page]. (Accessed 15. April 2005). Available at: <http://www.iff.ac.at/socec/backdoor/sose05-ring-sozoek/03_Minsch_04.pdf>.
- Ornetzeder, M., Suschek-Berger, J., 2005. Einfamilienhäuser innovativ sanieren: Erfolgskriterien und Übertragbarkeit von Best-Practice-Modellen im Einfamilienhausbereich. Final report 805804, Funded by the Ministry for Traffic, Innovation and Technology, Vienna.
- Perry, N., 1993. Scientific Communication, Innovation Networks and Organization Structures. In: *Journal of management studies* 30, 6, 957-974.
- Porter, M., 1980. *Competitive Strategy*. Free Press, New York.
- Putnam, R., 1993. *Making Democracy Work*. Princeton University Press, Princeton.
- Pyka, A., Küpper, G., (Eds.). 2002. *Innovation Networks, Theory and Practice*, Edward Elgar, Cheltenham.
- Schuster, G. et al., 2000. Wärmeschutzmaßnahmen an Wohngebäuden: Grundlagen für CO₂-Einsparpotentiale des österreichischen Nachkriegswohnbestandes. Zentrum für Bauen und Umwelt, Krens.
- Suschek-Berger, J., Ornetzeder, M., 2004. Cooperative Refurbishment: Occupant Participation in Sustainable Refurbishment Projects of Multi-Floor Buildings. In: XXXII IAHS World Congress on Housing, Sustainability of the Housing Projects, Conference Proceedings September 21-25, Trento, Italy.
- Weber, M., 2002. Innovation Networks and the Transformation of Large Socio-Technical Systems: The Case of Combined Heat and Power Technology. In: Pyka, A., Küpper, G., (Eds.). *I.c.*, 133-168.