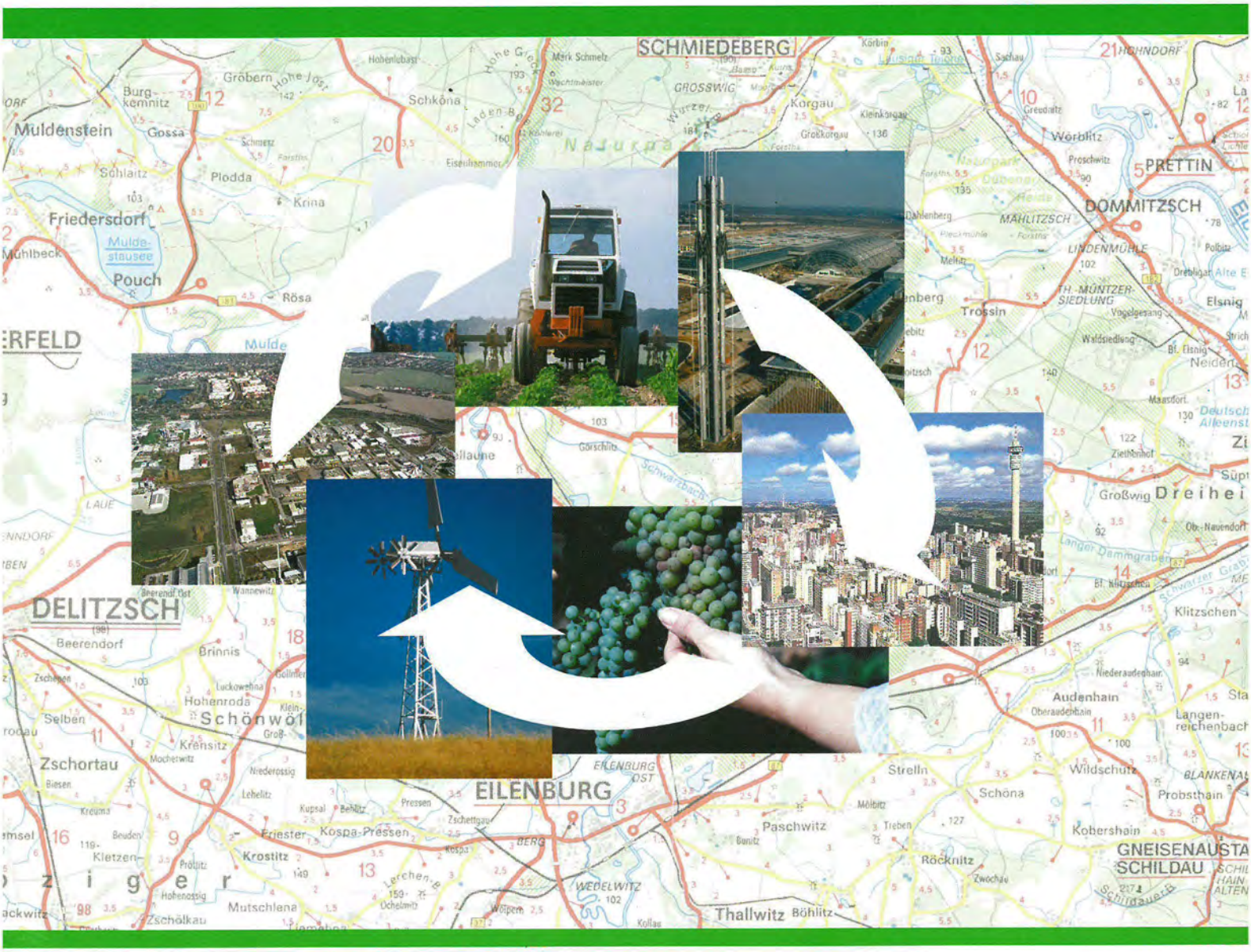
Thomas Kluge/Engelbert Schramm (Eds.):

Institute for
Social-Ecological
Research (ISOE)

Regional Approaches to Sustainable Economy: Potentials and Limits

Experiences from German Case-Studies



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Regional Approaches to Sustainable Economy

The research initiative "Model projects to sustainable economy" is just one of several activities currently being fostered by the German Federal Ministry for Education and Research (Bundesministerium für Bildung und Forschung), which are designed to align with the stipulations for sustainable development laid down during the Rio conference, 1992. The "Model projects to sustainable economy" initiative focuses on trans-disciplinary research based on practical experience, and aims to determine orientation guidelines for establishing systems of sustainable development.

In addition to local and national focusses, the regions are increasingly being viewed as bastions of sustainable development – a perspective that the initiative came to share. According to that theory, regionalised economy is on the path towards sustainable development; one which is environmentally-friendly and financially sound – whilst also enlivering social bonds. The limitation in space keeps transport distances short, and the amount of traffic pollution can be reduced. If wood cut in a region is also used there as building material, then profits will also remain in the region. Business amongst neighbours eases the negotations required, for after all, everyone is affected by the outcome. Regional identity and having a common culture and experiences offer a potential to be tapped for sustainable development.

Sustainable economy is not solely concerned with purely business activities – such as those involved in production and marketing. It also encompasses other activities such as shopping, cooking meals for school children or students, plus the organisation of social events, i.e. local festivals or the establishing of social networks. In international terms, the German research initiative provides a valuable augmentation to other countries' research programmes and to those set up by the European Union. It is also one of the primary approaches to systematically examining the hopes raised in regionalised economy for processes of sustainable development. Germany is thereby taking on a leading role in this field of sustainable development research.

Beginning in 1998, the German Federal Ministry for Research has up to now funded 15 model projects with a total of Euro 7.5 million: Partners have been found in business and scientific circles to jointly investigate regional approaches to sustainable economy. Most of these model projects have come to an successfully end. That makes it possible to synthesize the modelproject's results and to ask under what circumstances regions can serve as bastions of sustainability.

This brochure has been designed to present some of the initiative's specific and also its general results to the interested public – to politicians and regional planners as well as to economic actors and scientists. Ten years after Rio, the initiative's results aim to provide practical steps on a route towards more sustainable development.

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Model-Projects

List of the Model-Projects

- TU München-Weihenstephan, TAGWERK Genossenschaft, Institut für Sozialwissenschaftliche Forschung ISF München: Nachhaltigkeit durch regionale Vernetzung – Producer/Consumer Cooperatives in the Area of Nutrition (TAGWERK-Genossenschaft)
- Humboldt-Universität Berlin, Technische Universität Berlin, Zentrum Technik und Gesellschaft der TU Berlin: Methods of Increasing the Amount of Ecologically Produced Foodstuffs in Berlin-Brandenburg
- Forschungszentrum Arbeit und "Technik" und ZWE "Arbeit und Region" Universität Bremen: Inform – Offer – Legislate. Ways of Promoting Sustainable Patterns of Consumption Between Consensus and Conflict
- TAURUS-Institut, Universität Trier, Wuppertal Institut, Büro für ökologische Landentwicklung: Development of an Educational Model for the Regional Marketing of Foodstuffs
- Fraunhofer Institut Materialfluss und Logistik IML: Sustainable Economic Approaches to Supply and Disposal for Communal Kitchens – Products from and for the Region
- Fraunhofer Institut Systemtechnik und Innovationsforschung ISI: CuRa: Cooperation to Promote the Eco-friendly Exchange of Resources: Regional Networking of Companies Closing Energy and Material Cycles
- Institut für Umweltwirtschaftsanalysen IUWA, Universität Heidelberg, Universität Mannheim: Establishing a Sustainability-Oriented System of Sustainability-Oriented Material Flow Management in the Rhine-Neckar Industrial Region
- Fachhochschule Hamburg, Universität Hamburg, Ökopol, SUmBi: Efficiency Increase through Cooperation on Optimising Substance Flows
- Institut für Industriebetriebslehre und Industrielle Produktion IIP Universität Karlsruhe (TH): Development and Implementation of a Regional Concept for Energy Management and its Applications to the Karlsruhe Technology Region
- Öko-Institut Freiburg/Darmstadt: Sustainable Urban Districts in Areas of Inner-City Renewal: Material Flow Analysis as an Evaluative Approach
- Stiftung Bauhaus Dessau, IÖW: The Future of Work and Sustainable Regional Development
- Universität GH Kassel, IMU Dresden: Nachhaltiges Wirtschaften durch Regionalisierung von Wertschöpfungsketten unter globalen Rahmenbedingungen (Machbarkeitsstudie)
- Institut für umweltgerechte Landbewirtschaftung IFUL: The Maximum Use of Renewable Resources to Promote Regional Material Cycles – Assessment of Obstacles and Opportunities in the Housing Trade
- ITPS Institut für Theorie und Praxis der Subsistenz e.V.: Approaches to Regional Economic Activity in Rural Communities
- Institut für Produktdauerforschung (ipf)/Hochschule für Gestaltung Offenbach: Stärkung regionaler Ökonomien: New Arts and Crafts as Paradigmatic Contribution of Joinery

Christine Ax

A Region is Getting for which it Thinks to Be

Taking the metropolis Hamburg as an example and having at its background the need of 'living', in this essay the following questions are treated: which are the working – conditions of the furniture-maker in Hamburg today and how their positions in the regional market can become more powerful. The signification of the region for furniture-making artists and workman and the signification of these industries is considered from the target perspective of lasting regional development. In particular the economical and social conditions of production and consume are discussed in relation to the technological, economical and esthetical conditions in general for Hamburg.[1]

Who is Hamburg?

Who in Europe thinks of Hamburg thinks of the port of Hamburg, perhaps of the 'Reeperbahn' and the fish market. The port of Hamburg is strictly bound with the political power. The port and foreign trade especially with the New World has made Hamburg a big city. And Hamburg would love to stay big and important for the whole world. Seat of big companies, gateway to china, Japan and other nations, bridge to Northern and Eastern Europe, location of many industries of the future like Airbus Industries and AOL.[2]

The one who has attentively followed the economical politics in Hamburg notes that these priorities were consequently realized in the last four decades. The relationship between the townhall of Hamburg and the commerce represented in the Chamber of Commerce is really a close and respectable one. It is a kind of respect which derives from the idea that political legitimation of power in Hamburg depends from economical healthy.

This is not valid for the political relationship of the townhall to the second Camber of Commerce in Hamburg, the Chamber of handicrafts. The 13.000 smallest companies in Hamburg are the second 'employer' in town, but they are traditionally neglected by the 'big'-thinking economical politicians. The annual party of the Chamber of handicrafts of Hamburg which invites once a year politicians, administration and handicraft has its highlight in the speech and counter-speech of the president of the Camber of handicrafts and the mayor of Hamburg.

The Economical Conditions: The Furniture Market

The economical centre in Northern Europe is the metropolis Hamburg. This region enclose not only the town of Hamburg, the second largest town of Germany, but also an economical powerful radius with the economical regions of Brunsbüttel and the counties Cuxhaven, Harburg, Lauenburg, Lüchow-Dannenberg, Lüneburg, Pinneberg, Rotenburg (Wümme), Segeberg, Soltau-Fallingborstel, Stade, Steinburg, Stormam und Uelzen. The metropolis Hamburg was already in the Middle Ages the economical and trade centre for Northern Europe and the Baltic Sea. Also for the German capital Berlin, Hamburg represents a foreign trade centre of economical signification.

Furniture for Hamburg – Hamburg's Furniture

In the city centre there is a number of specialized furniture shops getting fewer and fewer. The various kinds of furniture offered there are exclusive and expensive. The big furniture discounters gain a growing market segment and find its locations at the border of the city with a good network of traffic. The situation of this industry is a difficult one for years, because there is on the one hand a growing

demand for the exclusive and wooden furniture, on the other hand there is a growing market for the cheaper or to take away-furniture. Having as a result that nearly 25% of the furniture sales in the retail trade is made with furniture in the high level price segment, the market segment of Hamburg's joiner's of furniture will be at about 125 millions of Euros.

Hamburg's Joiners of Furniture: Artisans, Handicrafts and Businessmen

To become a joiner of furniture in Germany you have to finish a tree years practical training. To get a master qualification you have to finish a one years training and you have to pay for the school at about 8.000 Euro. An alternative for the master training is the professional formation to become a journeyman which lasts two years.

In fact the corporation of wood and plastic materials in Hamburg knows about joiner's who produce also single furniture but at the same time the cooperation proceeds from the fact that really no joiner's workshop in Hamburg can live from the construction of furniture: www.tischler.de . The economical situation of the biggerest joiner's workshops in town during the last years seemed to be satisfactory, even if the turnover/employee with 100.000 Euros is not so much.

Is Handicraft too Expensive?

Looking or the reasons why sales of hand made furniture are getting fewer and fewer we find that there are not the high prices responsible for the situation of the branch, not today and even less in future. A comparison of prices in the best locations of furniture shops in Hamburg shows that hand made furniture is sold at market prices.

If the purchasing clients of today prefer Italian design furniture, then it's not because of the price. Concerning real knowledge about the handmade quality of a single piece, the really knowing client is rare and only an upper class phenomenon.[3]

The chances of the handicraft are promoted by the fact and the tendency that the purchase of furniture is less dominated from single brands than other consumer goods.[4] Location, quality and variety of the offers are the decisive stimuli for the client.

Proceeding from the point that the conditions for the handicrafts offering their "ecological furniture" as a "niche product" are nearly comparable, then beside the price we can find a number of conditions for the success on the market. The results of an inquiry realized at the beginning of the 90th from the university of Lüneburg is without doubts up-to-date until nowadays. These results shows us that beside the critical price the other two decisive points for buying or not-buying a single furniture are the effort of access and the doubt of genuineness of the product. Also the person interviewed do not like to drive far for a "niche product".

The Need of Working…

We find joiner's of furniture in Hamburg more easily in the category of artisans and cabinet-makers, designers without jobs who opened a workshop in a backyard or at the city border or in the neighbouring fields between art and design, between architecture and handicraft.

In spite of all these difficult working conditions there is production and there is the great love and enthusiasm for the own profession in these workshops. After all it is satisfaction of the joiner's of furniture which they find in the creative work with the material or it is a really succeeded design which makes their work so precious. So precious that they renounce of the social achievements the trade unions has obtained for their employees. This kind of work is often appreciated by the clients and

sometimes even by the publicity, but it is also related with much pain and mostly with a modest living. Workshops at the privileged locations with a high public frequency have a relatively good living. Workshops in border locations have some difficulties. They are looking for clients at fairs and exhibitions and the clients find the joiner's of furniture in Hamburg only by mouth-to-mouth-publicity, arts and crafts exhibitions or by chance.

What is Today Still Original Hamburg on the Furniture of Hamburg?

Although no one likes to answer this question related to the present days of Hamburg, it is really possible to find an answer from outside. Yes, they are existing until nowadays: the regional differences and particularities in this Europe of the regions. During a shortly realized workshop with artists and craftsmen[5] from four European regions who are pleased to express their region with forms and colours, we saw this very clear. The differences and the particularities are really obvious in direct comparison.

A look at Europe teaches us: the regions deal very different with their cultural heritage. The work force of the "cultural industries" both location factor and export factor is already for a long time recognized from Italy or the UK.

Electronic Handicraft: A Chance for Regional Workplaces ?

At the end of the "mass production"(Piore/Sabel[6]) today we note the perspective of a "after-industrial" structural change which condenses itself in the model of the "virtual production" (Davidow/Mallone[7]). This model of production and economics, developed on the base of new technologies, in the past was mainly examinded from the perspective of the industry and is discussed in the temporary literature as "mass-Customization" (B. Joseph Pine[8]) or "clients-individual mass-production" (Frank Piller[9]).

But the new technologies are not only a new challenge for the industry but also for the handicraft.[10] At the joiner's, the example in this study, 10 to 15% of all enterprises are connected with the internetand have CNC-maschines. So for the first time since the beginning of the industrialisation 150 years ago the handicraft is technological and economical competitive.

Nevertheless many requirements are still to meet for a renaissance of a workman's production. Using the particular forces of the new informational and computer-controlled production-technology an extensive structural change is necessary who embraces like the shoemakers[11] the whole process chain – development of a product, clients-communication, production and distribution.

The neo-handicraft kind of production which is characterised by some features like production of single pieces, direct clients contact, use of universal tools, small working units and decentralized structures, requires and favoured both in industries and handicraft a "neo-handicraft style of production" and the "virtual design".

For Ruskin and William Morris and also for other representatives of Arts and Crafts the mechanical production of "art" and of pretentiously designed products lied beyond the possible. An estimation that related to the technological standard of the machines at the end of the 19th century was quite clear. The contrast of the mechanical products and the results of genuine arts and crafts for every artificial educated observer of that time had to be a real catastrophe. It was the beginning of the "industrial design" which at least with the "Bauhaus" creates the bridge towards a new, "functional" esthetics.

The vision of an electronic handicraft might perhaps stand at the end of a process which has the target that the handicraft assumes the new arranging possibilities which result in the flexible tools and transform them in an economic successful model of production and consume. To this we need laboratories and workshops in which the artistic use of the new technological and designing possibi-

lities are in the centre of professional formation and experimental production. Locations of freedom and communication in a quickly changing world who is always seeking its (individual or collective) suitable shape. The gateway Hamburg might not be a bad place for this.

Endnotes

1 This essay reflects the results of a study with the title "strengthening of regional econimics: New Arts and Crafts at the joiner's workshop as an example" which was published in the years 2000/2001 from Prof. Jochen Gros, Dipl Dipl.Des. Dagmar Steffen, University of design (Hochschule für Gestaltung) Offenbach und Dr. Willy Bierter, Christine Ax (M.A.), Institut for product-resisting-research (Insitiut für Produktdauer-Forschung), Hamburg and Giebenach. A realisation of the results at the FFH Hamburg as an example is requested. For further informations please contact: http://www.hfg-offenbach.de/pubCont.hfg?fdId=32. The study can be ordered by: mailto:Scheld@em.uni-frankfurt.de . For further informations and contact please see www.ipf-hamburg.net und chrsitine-ax@ipf-hamburg.net

2 For further informations see: www.elbbucht.de

3 A representative interview about handmade shoes, which was practised in order of ipf Hamburg at the end of last year shows that the quality aspect of handmade products is realized especially at men and grows with the level of incoming and standard of formation.

4 Compare furniture, chiffres, facts, Holzmann publication.

5 During the European projekt eurocraft in 2001 there was a workshop at Rhodos during which was working in this manner with artists and craftsmen from Rhodos, Belfast, Erice (Sicilia) and Hamburg (www.craft2eu.de or www.eurocraft.de)

6 Piore, Michael J. Sabel, Charles F., Das Ende der Massenproduktion, Berlin 1985

7 Davidow, W.H., Mallone M.S., Frankfurt 1993

8 B. Joseph Pine, Mass-Customization: new dimension in competition, 1994 Wien

9 Clients-individual mass-production: A strategy of competition in future, from Frank T. Piller with an introduction from B. Joseph Pine II, München/Wien: Carl Hanser Verlag 1998

10 Compare Ax, Christine „The handicraft of the future- models for a lasting management", capter: Measure-production instead of mass-production, Page 103ff., Basel, Boston, Berlin 1997 (compare also www.ipf-hamburg.net)

11 ipf Hamburg is working for five years with the shoemakers to built up an extended rating of all the production processes with the help of a CAM-solution for a workman's measure-shoe-production which will be published next year as production platform (see www.massschuh.de) (for information see www.massschuh-galerie.de)

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The 'Stuff' of which Social Proximity is Made

Knowledge Gained from the Project: 'Approaches to Regional Economic Activity in Rural Society: The Warburg Plain'

The Local Supply Cycle as the Basis of Regional Economic Activity

One important finding within the framework of our project is that it makes no sense to see the re-regionalisation of economic activity as an alternative to the globalisation of the economy, let alone as something set in opposition to it. It is far more the case that the process of globalisation is complete in numerous aspects of economic activity, and from quite a few angles possibly desirable too, even though it also tends to appear destructive from many other standpoints. Then again, quite a few products and methods of production that nowadays dictate broad areas of our lives, such as electronic data processing, are an inseparable part of this process. Yet there are other products that are typically best catered for by using local expertise. These are subsistence products, namely those things we need to provide for ourselves on a daily basis to eat, drink, run the home, clothe ourselves, and enjoy social intercourse – in short, the things we need for a good, simple life.

When it comes to the making of these products, much of this production, or parts of it, actually still occurs locally, particularly in the countryside. Here we can distinguish three levels that one can best picture as superimposed layers, like a pyramid: the level of home or farm-based economic activity forms the base; the level comprising informal economic activity occupies the middle; and the level comprising formal, particularly craft-based economic activity is at the top. Most of the time it is only this apex that strikes us as a form of economic activity; whilst the vast remainder upon which the apex is constructed remains invisible from an economic standpoint, or, viewed critically, remains hidden to the economically blinkered observer. This is why we also call this pyramid an iceberg, the majority of which lies out of sight under water.

The basis of the supply economy is made up of cooking in people's homes, looking after children and old people within the home, preparing all types of preserves, and baking cakes for communal consumption, not forgetting cleaning, washing, ironing, and so forth. Much of this also intrudes into the sphere of informal economic activity, where work is done unpaid or without any formal contract. This is chiefly made up of helping out neighbours with things like building houses or carrying out repairs, together with communal work that benefits everyone, such as the surfacing of rural tracks or the decoration of the local Club's hall. Kitchen gardens and the corresponding swaps that go with them, together with the exchange of gifts, are also part of this informal economic activity, as is the rearing of small domestic livestock; eggs, meat, sausage, milk, and cheese are sold or presented as gifts, or may also be exchanged for other products or helpful services. In the Warburg Plain, the slaughtering of animals at home and the making of sausage are also a classic ingredient of informal economic activity, yet on the other hand they also verge upon both home/farm-based economic activity as well as formal economic activity. Not least of all, the 'homemade-style sausage' that is much prized in shops makes it clear that the formal master butcher's trade is founded upon informal, domestic or farm-based slaughtering at home. As a result of this link, there are still considerably more butcher's shops in the Warburg Plain than there are in the town, because they are able to count on their regular clientele. Customers assume they will encounter a standard and quality at their butcher's similar to what they are used to getting from home and their home slaughterman.

Home-based economic activity, slaughtering animals at home, helping one's neighbours, and farm-based economic activity ensure that people can provide well for themselves. They nurture their own products and specialities. However, they also thereby create the preconditions for the special skills

and special appreciation of home-grown crafts: butchering, slaughtering, baking, party catering services, landscape gardening, interior décor, joinery, the construction trade, floristry, gift items, tailoring, and so on. Upon this foundation develops something akin to a supply cycle, to which the crucial contribution is made by the home/farm-based and informal levels, yet without them setting themselves up in opposition to the formal market economy, as is often wrongly presumed. It is far more the case that the informal levels of the supply economy actually contribute to an increase in turnover, indeed to the very survival of the regional, formal level.

The local/regional supply cycle in the Warburg Plain, consisting of formal and informal economic activity, exists as a result of using people's own craft-based skills, particularly when it comes to good food (meat products, bread, cakes, garden vegetables) as well as building and housing. Circling around this core is an appreciation of things one can call one's own together with economic activity that benefits oneself. It is these circles that can be reinforced and extended. This is where the potential for regional economic activity and re-regionalisation lies. These circles can be further strengthened with regard to food, but also with regard to clothing, housing, and construction, and likewise with regard to work/production in local architecture, the craft industry, fine arts, music, literature, historical research, and much more. Upon this foundation it is possible to create jobs in the region, jobs whose net product will also in turn remain in the region: that is to say, it will have fresh value added to it within the region, instead of being drained out of it. The counterpart to this type of regionally integrating economic activity is the typical export zone where only a few product lines or monocultures for export are located, and which has declined into an impoverished site offering cheap wages to international investors.

Social Proximity Needs a 'Carrier'

In other words, the existing supply cycle can be seen as a stone that falls into the water and casts circular ripples. The non-material and cultural (rather than strictly material) contributions it makes are a crucial factor in allowing it to have this additional impact. It is well-known that a regard for what one can call one's own, which thereby underpins self-confidence and creativity, is closely linked with the nature of supply, with caring, with good food, clothing, and architectural and living styles. Groups of people use this to identify with one another and provide mutual support, and indeed this is also true in terms of economic activity. Furthermore, the nature of subsistence or supply is closely linked to the creation of an autonomous regional culture.[1] Moreover, the supply economy produces the proximity between people that is necessary to counteract the fragmentation and splintering that turn the individual into an anonymous, dependent consumer at the mercy of corporate globalised market activity with its uniform culture.

The village is the nucleus that is still best placed to support and maintain the supply economy with the corresponding spatial and social proximity. The village as we know it creates social capital: in its local clubs, at the local inn, at the local Club fair, during conversations on a bench in front of people's houses, when people are making sausage, when they're chatting over the garden fence... People know one another, rely on one another, and it is therefore less of an option to deliberately increase one's economic capital at the expense of others, as happens for example in the export zone factories that supply world markets. It might still be possible to set something up in opposition to predatory capitalism; small-scale economic activity might still be able to preserve the region's wealth.

In the light of our empirical knowledge, we would now argue that it is precisely these elements of the regional supply cycle that can easily be used to consolidate social networks or even create new ones, since they consist of everything people need for an (enjoyable) everyday life, with food taking pride of place. They can function, so to speak, as a stone that describes circles in the water. It is like

this because social proximity is not merely an abstract idea; it requires a 'carrier', and first and foremost this consists of the necessities and comforts of everyday life.[2]

And so, taking social links as our starting point, we arrive at the 'stuff' or substance referred to in the title. Food, meals, dishes ('communion') and other things of everyday importance are the substance that binds us not just in a material sense, but to an equal extent in a cultural sense too. It is this substance that must be more strongly re-regionalised as a matter of urgency, precisely because it *can* also be more strongly re-regionalised, since the basis exists and can be used as initial steps in this direction. Moreover, it would be an interesting empirical task for the future to explore the repercussions of a re-regionalisation of the production of supplies with respect to the regional integration of numerous other goods and elements.

Good Preconditions for a Regional Supply Cycle

Social cohesion in the Warburg Plain continues to exist, and people's identification with their region is high. Not least of all, this becomes clear from the many local clubs with their relatively high membership.

Furthermore, a citizen's action group emerged here in the Nineties in order to fight against a toxic waste dump. Once this initiative had been successful, some activists chose not to rest on their laurels, but found that the commitment manifested in opposition to the dump should actually serve as the springboard for further consideration of how things could continue in Bördeland and Diemeltal, of what *a life worth living* in this region might look like. Moreover, they too are of the opinion that the regionalisation of production and consumption is a crucial aspect. For several years now, activists in the group have been organising 'Regions Day', and on the last occasion it even took place on a nationwide scale.

A fertile plain is an agricultural area occupying a favoured location. In principle, the region we investigated is thus in an excellent position to provide for itself. However, since the Eighties it has been visibly transforming itself into a pronounced pig-rearing region. This has already given rise to fears that the Plain might develop into a wider region concentrating on intensive livestock farming.

It is obvious that pig production is aimed at national markets. It would be impossible for all the pigs that are fattened here to also be eaten here. It was not the intention of our project to alter this situation. That would only be possible over the very long term, and only via a change in the basic conditions: if, viewed relatively, agricultural produce were to become more expensive, and/or producers were to receive more for their products and were not obliged to assure their income by means of the number of animals kept.

Yet even in the production of pork there is still more of a regional economic slant than is immediately apparent. There is also a local 'pig cycle'; one can still find smaller farming operations with relatively few pigs, mostly kept on straw. Local butchers are very keen to take these animals because the quality of their meat is usually better, particularly because the animals are fattened more slowly. From time to time there are also agreements between butchers and the owners of pig-fattening units about the feed to be used. In any case, the regional speciality, *mettwurst,* tends to require the meat from older pigs; there are special business links here between piglet breeders and butcher's shops which are then glad to take the old sows.

There are 90 master butchers in the area in and around Höxter, whereas these days, for example, it is only possible to find 47 in Bielefeld. Furthermore, Bielefeld has approximately 300,000 inhabitants, namely roughly twice as many as in the Höxter area.[3]

Not least of all this is down to the fact that the tradition of slaughtering at home has been maintained up until the present day. Despite all statements to the contrary, there are an astonishing num-

ber of people who still do their own slaughtering: two or three families who club together to fetch a pig from the farmer and turn it into sausage with the aid of a home slaughterer. This may not weigh heavily in terms of quantity, but it certainly has a major impact in terms of the overall atmosphere. In places where people still do their own slaughtering, they are more likely to go to the butcher's than to the supermarket.

This is not necessarily the result of a conscious decision to willingly pursue a regional orientation. It is simply the conviction that meat from the butcher's is better than what can be bought in the supermarket. People tend to know the origin of the meat; they know what's lying there in the window displays. To some extent, of course, there is the additional factor that people know the butcher and his wife from some local association or bowling club, and they so feel they have social obligations.

Production that Supplies People's Basic Needs Supposedly 'Only Just' Still Exists

It is striking that when it comes to small farmers, pigs on straw, and slaughtering at home, all of this always only 'just about' still exists in people's consciousness. Everyone seems to be in agreement here. The farmer with his 30 pigs in their pens, pigs with which he regularly supplies the local butcher, is quite taken aback when we say we're interested in regional economic activity, and as such in an interview with him, and says: "But I don't actually run a business at all. If that's what you're after, you'll have to go and see the big pig farmer over there. He runs a business. But I don't."
There is no shortage of such talk. Small-scale economic activity is supposedly:

- in the process of disappearing *and*
- not worth mentioning.

This way of seeing things, the notion that only large-scale economic activity oriented towards money, the market, and the business economy constitutes genuine economic activity with a future is of course very much at odds with the regional concept.

We take a completely different view of this. That is why we used an exhibition, which was on display from 4th to 15th January 2002 in the local Club hall in Borgentreich (the focal point of the Plain), and which attracted around 1000 visitors, to try to make it clear that small-scale and informal economic activity is:

- very much worth mentioning *and*
- its disappearance might conceivably be prevented if it is valued accordingly.

We wanted to give a voice to those people who have made a very conscious decision in favour of a rationale other than that of growth, who are in no way looking to turn back the clock, but who also don't believe that salvation lies in always just carrying on as before, producing a situation where the small-scale has to give way to the large-scale.

We wanted to give a voice to the warehouseman who consciously decides against promotion at work even though it would have granted him an enhanced financial position. The way he sees it, his quality of life would suffer considerably. He would need to do overtime more frequently and would have less time for his family, the small livestock he keeps, and his club activities. For him, more money did not equate with improved quality of life. Quite the opposite. In the final analysis, he is possibly better off from an economic point of view as a result of his decision because it is doubtful whether the increase in salary would actually be sufficient to then purchase meat of the quality which is currently available to him. At all events, he would have forfeited some of his capacity to provide for himself, and would have made himself more dependent on his monetary income.

We wanted to give a voice to the farmer's wife who ensures that the sows aren't disposed of (even though this offends against the rule that one should make as little work as possible for oneself), and

who thereby maintains her own sphere of influence on the farm. Moreover, the farm would remain her chief source of income even if her husband decided to go to work outside the home; the tendency towards pig-fattening as an exclusive activity is also so problematic because it drives the women from the farms or turns them into casual workers.

We wanted to give a voice to the club president who sees jobs for young people as important, and who believes that old people should still be getting something out of life too. For him, it is important that the beer at the celebrations should come from Warburg ("So that our colleagues there have work too"), and he takes it for granted that the meat for the club meeting should be ordered from the local butcher.

We wanted to give a voice to the woman who on her farm is rewriting the classic role assigned to farmer's wives by further processing farm produce and marketing it herself. "I earn as much as other women who have a part-time job," she says. Her friends say: "All the same, she works twice as much." She laughs about this and says it's definitely true. "But then again," she says, "it isn't true either. After all, I'm at home, I can also interrupt my work from time to time or give it a rest, and it's definitely not the same as if I were to go out to work."

We wanted to give a voice to the man with the pig-fattening unit who sells his animals within the region, who fattens them for longer, and who thereby produces true quality that matters a great deal to local butchers. He does this because it earns him more money, yet he obviously also likes to control his own marketing and be more independent of *Westfleisch,* the region's main meat marketing company.

We wanted to give a voice to the women who continue to keep their hens on the farm even though their husbands tell them they'd undoubtedly be better off buying eggs from the pharmacy; women who are discovering new opportunities for making money on their farms, by organising children's birthday parties, looking after dogs, and turning milk into cheese.

What they all have in common is that the economic activities they are pursuing are supposedly uneconomical, that they are working for nothing or for little money. What they all have in common is that they do their sums differently: what matters is not just money in the bank, but also quality of life. They share the conviction that quality of life is not measured in terms of money, but that autonomy in one's economic activity is a value that should not be underestimated; they all believe that the important thing anyway is to appreciate those things one can call one's own, that village community is of major importance, and that it does not materialise on its own, but requires people who will nurture it.

The village exists, for example, because of the farmer and his wife who – against the recommendation of the Chamber of Agriculture – cling on to their medium-sized mixed farming business so as not to get into too much debt, which would mean they would then have to work too much to pay off the interest charges. It is important to them that they should also still have time to concern themselves with village matters.

The village exists because of the skilled worker who has never had any desire to leave the place, not even to go to the trading estate, and for whom the work he does is more important than the state of his order book. He prefers to earn less money, but to be in demand as a result of his craft skills.

The village exists because of the 'cake-baking' culture, because there are women who bake cakes for every conceivable occasion. Yet people are quick to overlook their importance, which is also of some economic significance, and every patissier admits: "If a cake costs 50 DM in the shop, any woman will bake six of them for you for that money."

'Region' Begins in the Mind

Picking Up on Things that are Taken for Granted...

Coming from the town, we could see very clearly what people here take so very much for granted: the way in which many people here still make use of the opportunities that exist to provide for themselves a little bit, and to use this as a basis for interacting with others. Although of course we were constantly hearing that people hardly ever slaughter animals at home these days, and that the local sausage is of less and less significance, a butcher in Borgentreich built a new abattoir right in the middle of the BSE crisis, and it happened again and again that people were unable to keep their appointments with us because they suddenly had to attend a home slaughtering.

We were impressed by how many women, often farmers' wives, cultivate a garden even though they're sure to have enough other work and despite the fact that, according to popular opinion, cultivating a garden "isn't profitable". We were interested to see people evidently calculating things in a way that differs from perspectives that follow a strictly business management approach. For instance, where it doesn't matter that one can buy lettuce in the supermarket for 1.50 DM when the lettuce seedling already costs 50 pfennigs, but where it *does* matter that the lettuce is fresh, hasn't been sprayed, and is at the back of the house. It matters that, particularly in summer, the vegetable garden gladdens the eye, and often, if not always, the work it involves gladdens the soul. It matters that it tastes better, that it conveys the satisfying feeling of knowing what one's got, and one has more or less grown it oneself. Furthermore, anyone who cultivates a garden always has something to give away, a reason to get into contact with people here and there, and they always have a subject of conversation when they're with others. If one includes all of this in one's calculations, a garden is worth the effort every time.

It's a similar story when it comes to keeping small livestock. Here, young people in particular also make use of the opportunities the land offers them: the fact they have the space and the buildings at their disposal, that they can organise feedstuffs, that there is an available wealth of know-how in the form of adults. Incidentally, this is also an important point: the way in which small-scale, informal economic activity on the doorstep shapes relations between the generations. When it comes to keeping small livestock, this usually refers to relations between young men and their fathers, yet if often also involves grandmothers who still know a vast amount about the slaughtering of such animals. In the garden, mothers and daughters or mothers-in-law and daughters-in-law often work together. Of course, things don't always run smoothly. Whatever the case, some young people thereby earn their pocket money and, quite incidentally, acquire important skills. This is wonderful project work.

If viewed from the perspective of 30 or 40 years ago, then of course everything has diminished. Nonetheless, an astonishing amount has also survived in this period, despite the *zeitgeist* and what is commonly said. Quite a few things, such as gathering bunches of herbs at Assumptiontide, have also blossomed afresh: in this respect, the gathering of bunches of medicinal herbs also has something to do with regional economic activity and/or its pre-conditions, since it strengthens identification with the region. Moreover, this clinging to or revival of tradition at the very least also seems to express a criticism of modern-day lifestyles more than the ways of doing business, as if one had to contend with the impoverishment of social relations, the increasingly distant relationship with Nature, and Man's crazy 'can do, must do' mentality.

Maybe the informal cycle of economic activity in the villages doesn't ensure people's economic livelihood to any great extent, yet on the other hand it is all the more likely to ensure social survival. Or to put it another way: the fact that there are still economic links between people (and that they are able to exist) ensures that people maintain social links with one another, and it provides these social links with, so to speak, a material basis. If there were no longer any economic activity between people, then social links would also become more arbitrary and short-lived. A woman from the local Club put it thus: "I've got hens, and I'm glad if I occasionally get three bundles of straw from people

I know. Otherwise I'd have to buy it or get hold of it some other way, so I do it via my circle of friends and acquaintances. ... People who haven't got any animals or who don't bake bread don't need them (that is to say links) either. Someone says: 'You've got hens? How ridiculous!' It's simply something I need. And of course it brings you into contact with people more, it creates togetherness."

Nowadays, people's social links are no longer forged as a result of economic necessities, as was once the case in the historical local economy. In terms of economic and other aspects, people are relatively independent of one another. They earn money. They're mobile. They have television. Nowadays it actually requires the decision to willingly adopt a regional orientation, to willingly enter into socially and economically binding relationships with one another. This becomes especially clear with regard to the village infrastructure.

Many people have already realised that it is actually in their own interest to preserve the small-scale skilled workers and shops on their doorstep. This is a discourse that undoubtedly exists: the fact that people think it's a shame if the last grocery store in the village closes, because people then meet up with one another less, and because places where one can communicate are necessary, quite apart from the convenience that comes with having a shop in the neighbourhood. People also notice the inherent disadvantage for those without a car, or the fact that if people have to drive more and more they are forced to buy a second car. They realise it's a question of quality of life as to whether one can buy milk in the village or make a complaint about one's washing machine on the spot, and whether one knows the craftsman or not. The price argument is frequently what stands in the way of spending one's money on the doorstep. The price rationale seems to wipe out any other rationale very easily: "I didn't dare say I bought the washing machine here, because then of course everyone would think I was daft," says one woman.

However, we often heard other opinions too: "People are having second thoughts", was the impression gained by quite a few of the respondents, because at the moment the more dominant trend still seems to be pointing in the direction of supermarkets. Thus a shopkeeper asked about the infrastructure in her village asserts she's perfectly sure that nobody will take over the reins in her shop. "It's not actually worth it to stand here in the shop day-in, day-out," she says. "I might just as well look for a '630 mark job' (i.e. one below the income tax threshold)."

Nevertheless, she admits this would bring with it a different kind of social prestige, since the fact she's a village shopkeeper means she is 'somebody', and that would turn out to be quite different in normal '630 mark jobs'. Yet she is hurt that the residents of the village pay too little attention to her plight, with the result that she finds it so difficult to make ends meet. She is considering whether she might present her goods more appealingly so that the temptation to buy would be greater, but she reckons she'd have to invest lots of money in order to achieve this. In reality she would need to attract residents of the village with things she can offer them that differ from what's available in big stores, instead of competing with them; in any case, there's no way she can rival the 'shopping experience' they provide. Yet she herself lacks the corresponding self-confidence for this, and likewise her fellow residents also don't have any sense of commercial dealings with one another that are based upon solidarity.

Despite the alternative practice that undoubtedly exists, the economic discourse that is explicitly formulated by people on the spot in the Warburg Plain is dominated by talk of maximising commercial returns. People say that the higher a company's turnover, the better the business; competition is more important than cooperation; the cheaper the product, the better it will sell, and so forth. These are all doctrines that naturally also have an impact on all the everyday economic decisions that are made, be they smaller or bigger. We believe that an alternative rhetoric would also promote an alternative practice, particularly since it is doubtless already present.

With this project and the presentation of our research findings in an exhibition, our intention was to contribute to the promotion of this alternative rhetoric. Moreover, we believe that we have suc-

ceeded in this. At the very least this is what we constantly heard over the two weeks that the exhibition and events were running: the fact that it is indeed the case that this is what goes to make up the quality of life in the region – being together, opportunities to provide for oneself, and having specific resources at one's disposal. Thus it seemed to dawn on some people that this is the reason why they have such an allegiance to the area, and why they don't want to move away, even though they have had to earn their money outside the area for a long time now. Moreover, we heard many expressions of good intentions from people who were wanting to preserve this quality of life for the future.

Endnotes

1 When, at the crack of dawn, the village band serenades the various dignatories at the local Club celebrations, people above all take pleasure in their own mettwurst (sort of air-dryed salame) that is provided as a way of saying thank you; and they go to a great deal of trouble with their own mettwurst so as to have something to offer on such occasions.

2 To take the family as an example, social proximity thus typically develops and becomes a reality as a result of good food, the way in which one is thoughtfully covered with a warm blanket, or the baking of Christmas cookies.

3 Höxter is the nearest reasonably-sized political & administrative unit within the region that was researched; Bielefeld is the name of the East Westphalian town the researchers come from.

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Conditions for Regional Networks and Material Flow Management: Thesis Based on a Neo-Institutional View

1. Introduction

Material flow management is a relatively new concept in the innovation-oriented debate on environmental and sustainable development. This approach replaces the medial oriented environmental policy on the micro and macro level in favour of a view concentrated on processes and participants, with the aim of a comprehensive sustainable management of material and product flows.

While the theoretical discussion on basic conditions, goals, methods and instruments of material flow management on the firms and global level is relatively far progressed and first practical experiences exist, the topic "regional material flow management networks" is treated rather subordinate and is in this respect still far away from a broad diffusion. As a result the rare existing experiences from predominantly publicly promoted pilot projects are at most fragmentary.

Result of these pilot projects is that the knowledge gaps for the building and stabilization of regional material flow networks are still relatively large. More research is necessary, i.e. less in the field of technical networking problems and their solution (solution of "hardware problems"), but particularly in the field of networking, i.e. in the area of the economic, organizational and social conditions and mechanisms of the formation and stabilization of material flow networks (solution of "software problems"). Especially also the phenomenon is to be explained, why material flow networks do not develop without external support despite assumed or real positive economic effects.[1]

This contribution tries to give some answers available from the project CuRa: Cooperation for environmental exchange of resources, project Middle Ruhr Area,[2] with the attempt, to reflect the current results of the (neo)institutionalism and related areas of research on conditions for regional networks and material flow management in the mirror of the practical and empirical results of the project.

The basic objective of the CuRa project was to identify and analyse the possibilities of material flow networks in the sense of the principles of the "industrial ecology" approach and prepare the transformation into illustrative examples. On the basis of selected material flows with regional significance or of groups of participants and their integration into regionally important material flows the options for the organization of a material flow network and their determinants should be revealed, the scope of the management of a material flow network should be described and evaluated on the basis of practical examples, incentive mechanisms and obstacles at the inter-company level for regional material flow utilization should be analysed, possible co-operation in the waste disposal and recycling area between enterprises as well as logistic services, disposal services etc. should be defined, resulting synergy potentials should be documented and prepared in form of transferable process models.

In the project CuRa: Middle Ruhr Area a network of car repair companies and gas stations (so-called "Eco-efficiency Network Automotive") had been developed. Initiated in a participant-oriented pre-phase (in particular via interviews with representatives of different companies, public institutions like chamber of commerce, consultants), a coordinated and innovative approach within the area of the disposal of solid and liquid waste (in particular waste from oil and petrol extractors) was well established. The Eco-efficiency Network Automotive plans to expand to other important garage-specific material flows.

2. Some Thesis and Findings from the Project CuRa: Middle Ruhr Area

2.1 Spatial Aspects of Material Flow Management

In connection with the spatial component of the material flow management the recommendation is placed frequently, that in a sustainable economy the flows of material within the geographical unit described by the region, must be closed, connected with the demand on the economy, to adapt their business objectives, the logistics of the raw materials and products to these conditions (regionalization of economy).[3] This is justified among other things with the fact that many materials, above all secondary raw material, can be processed appropriately in a regional context.[4]

In this respect it is important to understand the term "region" not as a geographical unit defined by political criteria but to understand a "region" as the network of economic, social and also ecological relations. Those political/economic structure of a region, e.g. defined by chamber districts or the like, shows only a reduced picture of the actual extended economic structure determined on the basis of the transaction relations.

The Middle Ruhr Area as the spatial context of CuRa is geographically seen an agglomeration of different cities in the Ruhr Area (340 km^2, 740,000 inhabitants).[5] With the cities Bochum, Witten, Herne and Hattingen the Middle Ruhr Area has an urban, densely populated polycentric region, shaped by special spatial and social proximity of the inhabitants and institutions. The Middle Ruhr Area is characterized by a specific relationship and milieu structure, which shaped the transaction conditions for the acting participants substantially and – depending on the perspective – hinders or stimulates innovation.[6]

In the CuRa project Middle Ruhr Area the geographical demarcation of the term region plays a rather subordinated role. As more important it turned out to be the social relation structure (interaction area) based on regional proximity. Thus the conditions of transactions for the economic and social interactions of the acting participants based on spatial connections are the basis of the network.

The findings of the CuRa project Middle Ruhr Area show that these specific relation structures are a substantial condition for the transformation of innovative concepts, presupposed, the innovator can use the collective learning processes, which happen within the regionally developed relation structures, for the genesis and conversion of his intentions.

A visible indication of this fact is that the regional eco-efficiency network automotive includes its members due to same or similar interest and not due to spatial borders and chamber districts. To that extent the "region" as a limiting factor was dissolved in the CuRa project Middle Ruhr Area and spatially expanded on all people interested in the utilization network. A spatial limiting factor are at most cost criteria within the route planning.

2.2 Structure and Function of the CuRa Network

Networks are characterized by a system of relations, established and maintained by the goals, activities and resources of the participants.[7] A social network is understood as an "independent form of the co-ordination of interactions..., based on the trusting co-operation of autonomous, but interdependent participants, who co-operate for a limited period of time and taking into consideration the interests of the respective partners , because in this way they can better realize their individual goals than by non-coordinated behaviour."[8] Hellmer et al. define networks similarly as "reciprocal as well as loosely tied up relations between a larger number of relatively autonomous participants. Thereby the participants are supposed to be in a interdependent relationship to each other. Loose ties on the one hand ensure autonomy and on the other hand reduces the risk to seal the network off, so that the exchange of resources and interactive reflexive learning processes between the participants are favoured."[9]

Thus networks represent a specific socio-economic configuration between market and hierarchy. They provide outputs, which otherwise can only be attained either by market or by hierarchy, i.e. the flexibility of market interaction and reliability and efficiency of organized structures at the same time.[10] An important aspect is, that the hybrid institutional organization form of networks enables simultaneity of competition and co-operation (so-called coopetition) within and between different organizational contexts.[11]

In this respect the eco-efficiency network automotive established in the CuRa project is a typical example: The participants are companies, which are competitors in their core business (sale and repairing subsidiaries of large car manufacturers like Daimler Benz, Renault, Opel, Volkswagen etc.). Nevertheless fields for co-operation exist, where the participants are not competitors, e.g. disposal, health protection and industrial safety etc. In fact, to initiate co-operative structures in pre-competitive areas, institutional arrangements of a certain kind are necessary to provide arenas of trust beyond economically reasonable arguments (see chapter 2.4.).

Furthermore networks allow to accomplish (economic) exchange without getting involved with the uncertainties of markets. At the same time networks enable a coordination of the behaviour of a group of participants without accepting a rigid structure of the organization of workflow and of an organizational set-up. Networks fulfil two functions, which no other form of co-ordination can make available:

- they reduce the uncertainty concerning the behaviour of other participants, e.g. competitors, partners etc. (strategic function),
- they enable an increase in efficiency, i.e. an increase of the own output (instrumental function).[12]

Considering the CuRa findings this thesis can be confirmed especially for horizontal material flow management networks. A pure market co-ordination of the disposal service in the Eco-efficiency Network Automotive does not supply absorption of uncertainty, since within the relevant pre-competitive area of disposal prices between competitors (related to the core business) are not communicated usually. By communication of prices and other institutional rules the network co-ordination can set up competitive processes on the level of the service providers of the collective good, which obtain high efficiency advantages for the network participants and absorb uncertainty.

2.3 Advantages of Regional Proximity in Networks

The neo-institutional network theory and the literature on national and regional innovation systems state that networks become more important also in the innovation process and in the regional context,[13] associated with upcoming new terms such as clustering,[14] regional innovation systems,[15] regions as promotors of innovation.[16] That shows that the regional level gains in importance and regional networks apply as a prototype of new arenas of decentralized control and cross-linking.[17] The agglomeration in spatial proximity is justified in terms of transaction costs rising up with an increase of vertical division of labour transactions between enterprises (in the form of sources of supply, information exchange and face to face contacts). As far as these transactions are usually connected with costs depending on distance and time, the companies concerned tend to produce in spatial proximity to each other.[18]

The unity and strength of such systems of flexible specialization does not only result from contractual connection, but also from personal, partly relational contacts. The community feeling cultivated in the region as well as political supporting measures, which reduce the internal competition pressure, are important, too. In such regional networks personal, informal contacts play an important role. Companies involved in a network use these contacts to supply themselves with information, to close contracts and to mobilize support (for instance in case of a supplier failure). In this respect net-

works can evolutionary develop, allowing companies involved to realize value chains by flexible specialization, which none of the participants could control alone.[19]

In the mirror of the CuRa findings this thesis can be confirmed at full extent. The most important aspect turned out to be the range of existing secondary networks of the key participants involved and the relations of confidence already embodied in these networks. On this background the following recommendation can be derived more generally for the mobilization of networks by intermediates: try to refer to existing institutional arrangements, before setting up an own coordination for an initial community.

Besides the above aspect, in the discussion on the mechanisms of social networks it is frequently stated that reciprocity and recursiveness are essential to gain confidence on the individual and collective level. They are supposed as to work as micro-constitutional regulation mechanisms in networks.[20] Furthermore the emergence of a regional basis of confidence is seen as an important factor, for example

- by common socio-cultural values and traditions or by embedding into a common everyday life (characteristic-based trust),
- by creation of institutions (e.g. regional economic and industrial policy, regional education and research establishments, regional banks, common fairs etc; institutionally-based trust),
- as a result of positive experiences with co-operation. In this case regional institutions function as arenas for communication, coordination and negotiation processes of regional participants (process-based trust).[21]

These spatial aspects played a central role within the initiation phase of the Eco-efficiency Network Automotive: "one knows each other in the region", due to regional occasions (meetings of the chambers, industrial associations etc.) up to personal relation structures, which are said to be of special stability in the Ruhr Area. Central element of the initiation activities in the context of the empirical phase of the CuRa project Middle Ruhr Area was the access to an existing institutional arrangement named "Bochum Mobile". This group consists of local industrial power promoters from different as well as same industries, intermediate institutions (e.g. chambers of commerce, technology centres) and the "right" political participants (mayor etc.). In this committee an evolutionary developed basis of confidence between the participants (process-based trust) exists, developing their own socio-cultural values (characteristic-based trust; for instance with the choice of the meeting place, the host functions etc.) and which at least profits from institutional relations of trust based on the close interconnection with regional intermediates (institutionally-based trust).

The regional significance of such networks is connected with the discussion about regional learning.[22] In this context the following advantages are awarded to regional networks:

- On the regional level stimuli beyond established methods of thinking and behavioural patterns are expected.
- Within a region one can meet more easily. More frequent contacts increase the chances for the development of confidence.
- The passing on of tacit knowledge is carried out faster.

So far regional networks can facilitate enterprises to scrutinize past routines and to discover new fields of action and new possibilities to come to a decision. "The efficiency of regional economies can be founded less on local resources, advantages in transaction and specialization. The opportunities for learning and innovation, provided by spatial proximity, become even more important. These learning processes take place in regional communication and co-operation networks",[23] whereby regional learning is facilitated "by diversified networks of communication and co-operation, efficient small and medium-sized enterprises, regional 'network mediators' and by the supply of collective goods."[24]

In the prephase of initiating the Eco-efficiency Network Automotive it could be ascertained that most participants rated such a platform as an incentive for a systematic exchange of experience

beyond problems of the daily routine up to the possibility of bilateral or multilateral joint projects. The "learning by interacting" was initiated on the basis of one material flow with a well defined and manageable starting situation and problem definition. The aim was to develop a solution with synergetic use for all participants involved. The success of this solution contributed to the development of a "process-based trust", to a growing basis of confidence and to a rather informal set of (social) rules. Promoted by the open communication of the intermediate, this led to an open and diversified communication structure with extensive bilateral contacts. In the meantime the network agreed on a wider program, which plans an expansion of co-operation in the network on other material flows and related topics. But, to mobilze an ongoing network cohesion especially in the area of sustainable regional activities, a continuously working driving force has to be implemented on a regional level (see chapter 2.4.).

In these regional clusters economies of scale as well as economies of scope are attainable at the same time (so-called collective efficiency[25]). The competitiveness of these clusters is based on rapid diffusion of incremental innovations promoted by mutual learning, which are developed frequently even in these spatial units. However, basic innovations are rarely or hardly to observe. In these clusters it is possible, that co-operation and competition are next to each other at the same time, since the inter-company relationships are part of a dense social network, which generates trust.[26] Thereby regions form a catalyst to set up confidence by spatial proximity on the economic and political level.[27]

2.4 The Function of Intermediates

For the setting up of an economically and ecologically workable material flow management network the acting participants, their different interests, the structures of decision processes and of the exchange of information (transaction structures) as well as the associated property rights over resources and materials are essential.[28] In this respect material flow management is the result of different control impulses of different participants involved into a material flow.

An important, if not central group of participants for the initiation and stabilization of regional material flow management networks are intermediates[29] like environmental service companies, environmental agencies, consulting firms etc. On the horizontal level they can perform the management of information, on the vertical level they can take over the tasks of a material flow management between enterprises of a value chain.

The success of mobilization within the initiation phase of the Eco-efficiency Network Automotive can indeed be explained by the central role of the intermediate, his expertise and power. This intermediate disposes own local and regional networks with familiar, historically developed relationships (e.g. in the regional policy, industrial associations, chambers of commerce etc.) as well as connections into hierarchical transaction structures (via the function as the managing director of the intermediate organization, which is at the same time subsidiary of a global player in the automotive industry), which are able to generate the critical mass important for a pool solution etc.

This intermediate played a central role for the network especially during the phase "formation of an opinion". Thus the process of the group cohesion aligned itself at the phenomenon, that the group of initial participants and the new (potential) members of the network adopted the argumentation about the advantages of a membership of the opinion leader and that this argumentation converted into their individual system of objectives according to the principle "learning by interacting". Obviously a mechanism exists to be describe as imitation that helps to develop a collective coherent opinion ("when a global player proceeds in such a way, this cannot be wrong"). The reliability and credibility of the solution offered were evaluated not with formal methods, but by the role of the intermediate as a process and power promoter entrusted in the way of getting confidence in advance.

In addition the intermediate definitely possesses the competences important for the pooling of groups. This includes abilities in communication, monitoring and mediation competences, the capability to develop strategies taking into account the impacts of measures on the participants etc.

Apart from the personal competences of the intermediate, which shape his role as a process- and power promoter, it is important to ask, in which institutional meta-structures the central participants are integrated. However, due to the own economic interest of the intermediate (i.e. because of his integration in a large group of companies) one can assume, that the intermediate tries to achieve a pareto-optimum for the network. The intermediate has no reason to act opposite to other network participants, because he is organized as a profit-center. For example he has no cause for passing on distorted prices for the collective good of "co-operative disposal".

The research and realization strategy of the CuRa project was to install economic mechanisms with the aim, that the intermediate integrates the functioning of the network in his own business strategy – connected with middle- to long-term business perspectives. Due to the implemented incentive mechanisms for the intermediate he more or less intrinsically pursues collective goals (which have double dividends in themselves). At least in the relationship of the intermediate to the remaining network participants divergences between individual and collective goals do not exist. On the contrary due to the implemented incentive mechanisms the pursuit of common goals is connected with an increase of the achievement of the individual objectives of the intermediate ("profit from the network").

To this extent the integration of an intermediate seems to be very helpful for the mobilization of such networks of inter-company material flow management. Especially if the intermediate is capable to realize a business using the economies of scale as a result of the common business the incentives for regional material flow networks increase.

3. Conclusions: Conditions of Regional Material Flow Management Networks

Regarding the mentioned thesis and findings resp. the experiences in the CuRa project Middle Ruhr Area the following conclusions about regional context conditions for the initiation and stabilization of material flow management networks can be drawn:

a) The economic viability of technical and organizational links on the level of material and energy flows is a necessary but not a sufficient condition for functioning networks. Only regional proximity, the construction of confidence between the partners, a set up of rules in the co-operation as well as some time in advance, in which the participants learn to estimate the situation of their prospective partners, enable a transfer of economical-technically feasible concepts into practice.

b) Regional networks with connections that are too close and uni- or multilaterally dependant tend to hinder innovation. The potential lack of continuity in tieing up material flows, the variation in quality and quantity, rigid process links, organizational dependencies with expected convoy problems etc. have to be overcome during network planning. Networks require the mechanism of redundancy, buffers and organizational slack to keep the flexibility.

c) The creation of an awareness of problems is an important step in the context of the transformation of sustainable strategies via mobilization of networks. As far as that goes an increasing amount of psychology comes into play. Therefore the successful mobilization lives from the pointing out of benefits and chances of each individual partner but also from the successful access to familiar key persons in the existing regional participant system, who function as opinion leaders. Group-dynamic processes in regional arenas of negotiation (e.g. processes of the Agenda 21) can promote such developments, if they are properly arranged and controlled. Apart from the objectives of the network the practicability of the method to achieve these goals has to be ensured. It is also important to contact the "right persons", that means, the selection of process and power promoters in the region.

d) The region of the participants determines the region of the material flow, because promising starting points for cross-linking activities are rather found in relations between participants that are already established. Participant orientation therefore becomes the crucial lever for regional material cross-linking. It is important to have regular face-to-face contacts and, depending on the topic, a larger or smaller spatial proximity.

e) Successful conditions for bilateral and multilateral material flow management networks are of a different nature: for multilateral networks regional key participants with outstanding reputation are of importance. For bilateral networks they are not absolutely necessary. Inter-company networks beyond existing trade relations require a higher willingness of the partners to take risks and a longer time in advance, to evaluate reliability of the material flows and the partners. Multilateral networks such as pool solutions are able to take a stronger fluctuation of partners, due to their redundancy, without the loss of efficiency. Each form of cross-linking has its specific strength with different material or energy flows and under different basic conditions.

f) The regional basic conditions for material flow management networks are determined by special institutional arrangements and thus predestined transaction conditions for the genesis and conversion of (new) approaches of sustainable development.

g) The development of these specific institutional arrangements is partially favoured by spatial factors, as far as close socio-economic relationships contribute to the setting of sustainable relations capital of the acting participants. But they are also disturbing as far as cognitive lock-in effects are spatially determined and so impulses from the outside are omitted. The spatial proximity in the sense of short ways (geographical proximity) is a necessary condition for the implementation of new concepts of sustainable development.

h) In addition a sufficient condition is, that an innovator is able to use the latently existing potential of relationships ("socio-economic milieu") in a regional surrounding between the participants acting there for his purpose. The mental proximity in the sense of confidence and ways of close coordination and communication is a sufficient condition for the implementation of new concepts of sustainable development.

In this sense the institutional arrangements found in the CuRa project Middle Ruhr Area define transaction conditions with favourable characteristics for material flow management networks. Favourable conditions for transactions arise from a specific combination of different forms of co-ordination and configurations of participants. It makes sense to have a loose and flexible arrangement at the beginning, that has time to generate purposeful co-operation by the creation of confidence out of the existing regional relationships. A successful network develops its own rules in the consent of the participants over time and thereby develops transaction conditions with social, ecological and economic advantages evolutionary. In the beginning a focal participant with strong regional ties is favourable as the driving force, who carries out an open information policy and who uses his role as a gatekeeper for the institutional arrangement. It is also favourable to have a specific profile of process-referred and structure-referred co-ordination forms of the institutional arrangement,[30] i.e.

- as many market mechanism as needed for the advantage of the institutional arrangement as a group of economically acting participants referring to aspects such as economies of scale etc.,
- as much threat (as tactical bargaining), as, e. g. a focal participant needs for the control of a co-operation network in order to take the hurdles in the beginning by setting facts,
- as much discourse, as not attainable through tactical bargaining,
- as much consent, so that entrance thresholds can be taken,
- use of hierarchy, in order not to peter out by market co-ordination,
- production of majority decisions, in order to give one´s placet to general pictures of the prevailing mood institutionally,

- a maximum of competence in negotiation of the focal network participant, in order to be able to influence mechanisms of sanction and collective learning processes of the network,
- as much insurance, that members of the institutional arrangement do not take cognitive dissonances home (in the sense of a continuous search for the resolution).

The description of these factors shows, that the substantial context conditions of regional material flow management networks are shaped rather by socio-economic regional factors than by spatial geographical factors.

4. Recommendations

Considering the experiences and results of the CuRa project Middle Ruhr Area the following recommendations can be derived for a successful initiation and stabilization of regional material flow management networks.

Small Almanac for the Mobilization of Regional Material Flow Management Networks
*11 rules of a partisan strategy**

1. Understand networks as an instrument for the production of convergence between individual and collective goals. Realize that individual objectives are rather economically motivated, whereas collective objectives are rather ecological and socially motivated.
2. Look for key persons, who already dispose of own well running networks. Insure yourself about their image in the region and analyse the specific site conditions, as well as dependencies of these key persons. Infect them with your idea.
3. Use collective behavioural arrangements as means for the improvement of the key participants to reach their individual objectives.
4. Create areas of interaction and negotiation, where the regional participants can understand themselves as equal partners. Create confidence between the potential partners by reinforcing parallel interests. If you meet with opposition, look for other combatants on regional level.
5. Use, if necessary, all control media of hierarchy and market to influence behaviour: threaten with social sanctions. State that the other partners have already joined the network and profit from it. Produce a positive atmosphere among the participants. Promise public subsidy, live on announcement policies.
6. Take care for the key persons to earn money with the transformation of collective objectives. Transfer the responsibility to them. Provide mutual benefits in the network.
7. Look for material flows and/or associated problems, that hurt all. Keep in mind however that the regional component is only one problem of the control of material flows and referring innovations.
8. Be aware that networks are only able to create incremental innovations and that the process is more important. Realize that the basic innovation lies in the initiation of learning processes of the involved persons. Make sure that the key persons learn first and then function as multipliers. Practicians is rather believed!
9. Use all tricks to change the rules of the game. Use psychological contracts. Make the hesitators feel as if they miss something, in case they do not participate. Make use of the existing institutional arrangements. Profit from logrolling and backscratching in felted structures. Block doubters. Permit activities beyond the region. Be able to overcome considerations only in chamber borders and labour office districts.
10. Always declare that the transaction costs are optimised by the network. Let practicians declare that. Allow the participants “first- mover profits”, in particular at the beginning, and above all personal success, that help themselves to acquire status in their own hierarchies Avoid too many knots in the network, otherwise the participants may fall!
11. Strengthen the self-dynamic of the network by public relations. Do something good and talk about it. Repeat your impulses, as often as necessary. Finance yourself with public means.

* for regional managers, research consultants, consulting researchers and other intermediates. The 11 rules have been presented as an impulse statement during a panel discussion by Joachim Hafkesbrink on the occasion of the BMBF (Federal Ministry of Education and Research) status seminar „Model projects for sustainable management" on march 5th and 6th in Bad Lauterberg (Bella-Ciao).

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2 The project CuRa: Cooperation for environmental exchange of resources is a research project promoted by the BMBF (Federal Ministry of Education and Research) and conducted by Fraunhofer-Institute of Systems and Innovation Research, Karlsruhe as well as by AROEW GmbH (Gesellschaft für Arbeits-, Reorganisations- und oekologische Wirtschaftsberatung mbH), Duisburg. The project ran out in September 2001.

3 See Flatz, A. (1996): Von der Abfallbewirtschaftung zum Stoffstrommanagement – Organisationsansätze am Beispiel elektrotechnischer Produkte, Wien 1996, p. 112.

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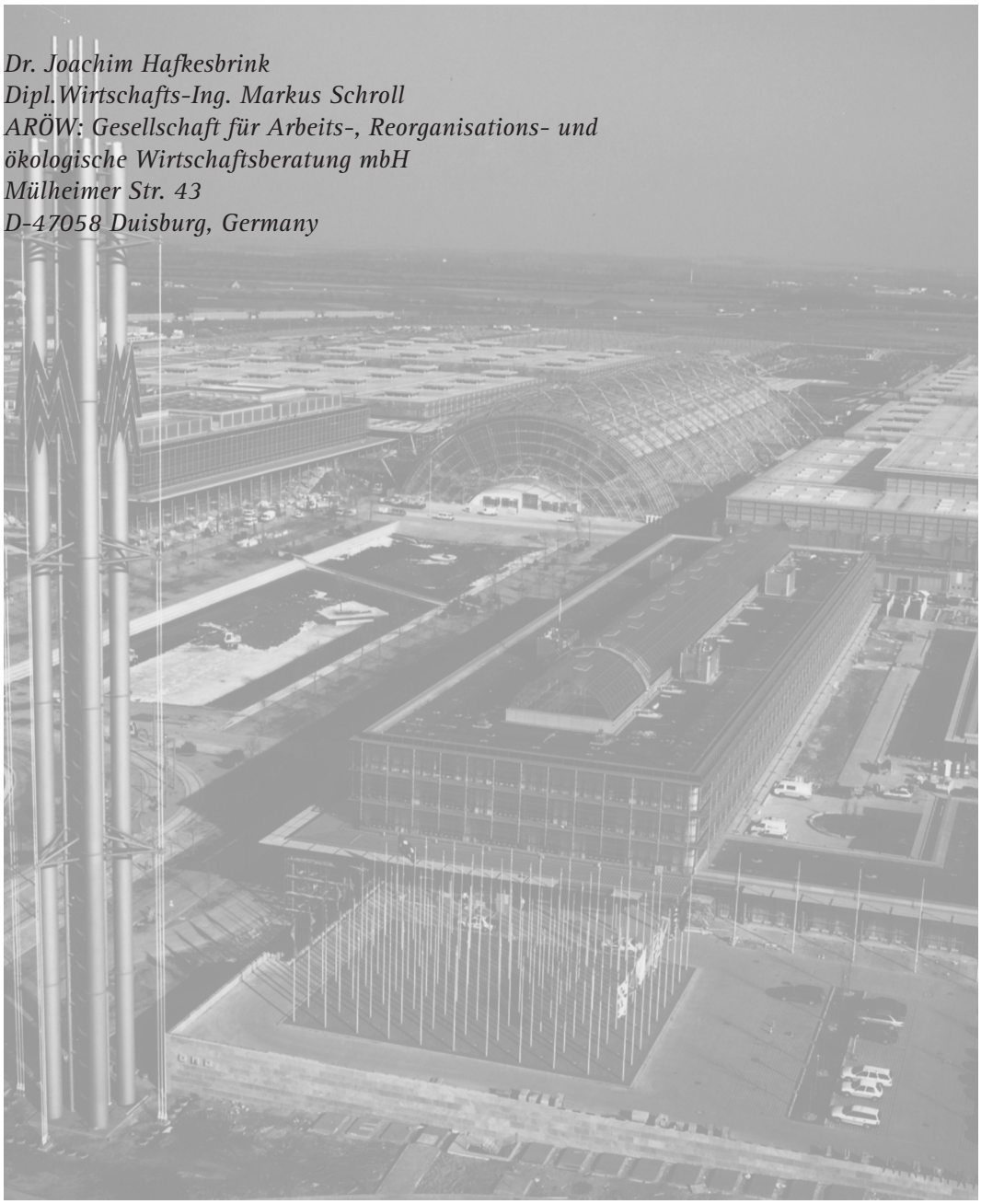

Networking for Innovations

Arnim von Gleich/Manuel Gottschick/Dirk Jepsen

The Metropolis Region as a Centre of Gravity for Sustainable Development

Spatial Proximity as a Success Factor for the Sustainability-Oriented Modernisation of Production Systems

Summary

Initiating a sustainability discourse with the economic participants in a metropolis region can make substantial contributions to the implementation of sustainable development, both in the dimension of the metropolis region as well as in the extended global dimension. This is demonstrated by the results of the three-year joint model project "Efficiency Increase through Cooperation on Optimising Substance Flows: Sustainable Metallurgy in Hamburg."

A direct link was established between the sustainability principle which expressly integrates economic stability and adaptability and the central discussions on a regional economy in this regard. Particular points of reference in this respect were the growing significance of the "home base" as a factor in (large) globally active companies' decisions to locate in a certain area, as well as inter-company cooperation within the framework of the structural modernisation of small and medium-sized supply companies.

In this context, the economic region played a central role. However, it constitutes to a lesser extent a closed geographical area, but rather the sphere of activity of the economic participants who interact in direct face-to-face communication. Here, the face-to-face contact generates spatial proximity in the sense of a subjective proximity which boosts confidence. In addition, the economic region also acts as a "home" region that establishes identity and a point of social control for the commitments necessary for future-oriented cooperation agreements.

In this article, we will demonstrate the distinctive features of such a regional approach to sustainable development. Further central areas of the work and results of the research project we carried out, such as, for example, the particular opportunities offered by various metals in sustainable resource management, or the use of model-supporting backcasting in dialog among market participants, will only be mentioned in fringe areas here.

The Hamburg Economic Region

With around 1.7 million residents on an area of 755 km^2, the Free Hanseatic City of Hamburg is the second-largest city in Germany after Berlin. The city-state is thereby integrated into a conurbation that stretches far beyond the city limits. Apart from the core city, the regional planning zone[1] – Hamburg region – also comprises the six adjoining districts in the states of Schleswig-Holstein and Lower Saxony. A total of around 3 million residents live here on a 7,304 km^2-area. The limits of the Hamburg metropolis region are even more comprehensive. They were defined as the result of the increased cross-state activities in 1991 between the state governments of the federal states of Schleswig-Holstein, Hamburg and Lower Saxony. The region comprises an area of 18,116 km^2 and a resident population of around 4 million.

Irrespective of the various regional demarcations, it is clearly evident that the Hamburg economic region is not a self-contained economic area, but rather a "hub" in the economic networks that extend around the world. However, on closer inspection, it is more correct to say it is comprised of a number of such worldwide economic cooperation agreements within which important companies – in their function as "hubs" – are located in the region. The proliferation of such world market-oriented companies is part of the maritime heritage of this large German port city.

In those fields in which the companies located in Hamburg are system leaders in the respective production or trading chains – i.e. areas in which they decisively influence design, manufacture or marketing – extended effects on fundamental aspects of sustainability can be discerned. Such power lines extend e.g. from the copper mines of Southeast Asia or South America via textile production companies in India and China right up to forest management in regions of Siberia or Canada. In this sense, the Hamburg economic region is also a kind of "centre of gravity" of a sustainable development.

In light of the importance of the region in terms of size as well as its radiation effect, it is indisputable that it is appropriate to initiate substantial steps towards a sustainable form of economic development here. However, what sort of steps this could entail and the role the region itself would play for significant world market companies in this respect, above and beyond purely providing the sites for industrial development, was the topic of these research activities.

Process Instead of Management Strategy

Without even carrying out an in-depth analysis, formulating specific management stimuli that could support the sustainability orientation of such a widely extended region in a targeted manner appears to be an undertaking with only poor success prospects, in light of the complexity of the overall system. However, in the authors' opinion, the use of such management strategies appears to have very narrow limits anyway within the framework of a "sustainability" project. The many-faceted nature of a truly multi-dimensional sustainability approach already leads to complex systems within very clearly defined frameworks such that it is virtually impossible to achieve a satisfactory correspondence between management intention and management result in such systems, even by disproportionately increasing the time and effort put into modelling and management.

The situation could be different if one were to pursue a process-oriented strategy. As part of such a strategy, the overall system would not be determined by regulatory intervention in the coordination mechanisms, but rather primarily by means of the motivating and mobilising power of goal-setting guiding principles. Experience shows that management on the basis of defined goals and objectives is suitable for complex economic structures, for example with management-by-objective approaches in the management of large corporations.

Guiding Principles – Functions and Requirements

However, the guiding principles of these management approaches differ greatly from the defined goals and objectives. Therefore, determining or prescribing a guiding principle for larger groups of market participants can be excluded.[2] And anyway, the question of how effective guiding principles arise – such as the "car-friendly city" of the 1960s and 1970s, or the "city as a place to live and experience life" of the 1990s – has hitherto hardly been satisfactorily answered, such that it rather constitutes a future research agenda between culture, economy and the manageability of development processes in society.[3]

Nonetheless, it can certainly be determined that guiding principles possess at least three central guiding functions that are interesting in the context of a regional sustainability orientation[4]:

- Guiding principles consolidate the intention and the expertise of the participants involved with regard to what appears to them to be feasible and desirable (collective projection).
- Guiding principles direct the individual perceptions and evaluations of the participants involved to a common directional area (synchronous pre-adaptation).
- Guiding principles facilitate and enable communication between representatives of various fields of knowledge, by taking the place of the regulatory systems and logical decision-making patterns (of the institution that is in its infancy) that do not yet exist (functional equivalent).

Thus the question that was at the core of the Hamburg research group's activities was how the formation of such a "guiding principle of sustainability" that would set targets for economic participants in the companies and institutions in the region that are related to the economy can be supported. In this respect, we assumed that guiding principles:

- must be compatible with existing guiding principles or be able to dominate them,
- must be able to adopt or suit the spirit of the times *(Zeitgeist)*,
- need a vivid power to have a cross-discipline governing effect for the group of participants,
- can only be established through consensual processes,
- require mentors in the initial phase who are convincing, prestigious and assertive,
- emerge especially after crises or can complement existing guiding principles with new visions for solutions, and
- are stabilised by symbols and successes.

The Hamburg Metal Processing Industry's Field of Activity

We purposely chose the metal processing industry, including mechanical engineering and metal production, as a practical example. This choice is firstly based on the fact that metals can play a central role in sustainable resource management, in the authors' opinion, because of their special potential for material flow management (circulation). On the other hand, precisely the metal processing industry described above has a central function as a connecting link in the industrial network of a metropolis region because of both its supply and service roles. The status and situation of this economic sector can be described in highlights as follows.

Mechanical engineering in Hamburg originally developed with a high dependence on the regional sales markets. These were the shipyards, the port service providers with their large requirements for mechanical handling equipment, the food industry, which processed raw materials imported from abroad, and the construction industry. The profound changes that took place in these bellwether industries because of the economic turbulences of the 1970s and 1980s were the cause of the high level of labour shedding in this time.

Hamburg's mechanical engineering industry was hard put to adopt a new orientation towards other markets in most areas of the sector. In particular the change from producing comparatively simple (basic) mechanical parts to the manufacture of complex technical apparatus was an almost insurmountable obstacle for many companies.[5]

Furthermore, despite a number of company closures in recent years, the mechanical engineering sector in Hamburg is still very strong in terms of numbers, and is in itself so heterogeneous that the companies can find little common ground for the merging and interaction of the resources. The chances for a regional "pooling of resources"[6] to develop new expertise, products and processes that are regionally entrenched are very slim.[7] This leads to a situation in which the majority of the suppliers of metal and mechanical engineering manufacturing components to the large companies located in Hamburg that are active in the areas of mechanical handling equipment, medical technology or aircraft manufacture are not themselves located in the region; instead, cooperation agreements with partners and suppliers outside the economic region dominate in this area.

The heterogeneous Hamburg business sector and the low number of suppliers who are adequately suitable in the eyes of their customers mutually reinforce each other and thus stabilise the inner regional network at a comparatively low overall level: "On the one hand, the relatively broad production spectrum of Hamburg's industry, with a correspondingly low degree of specialisation and the low occupation in individual sectors, make the demand for certain pre-products too low to justify

investments in new production capacities in the region. On the other hand, a number of Hamburg-based companies apparently also find it hard to outsource individual functions or value-chain stages."[8]

Access Barriers to Sustainability Potentials

In the context of the above-mentioned requirements for guiding principles of sustainability for this area, the subjective perception of the current situation is particularly important. Thus for example, the estimations often heard among the employees of companies we contacted in the course of the project constitute an important reservation against "simple" solutions, irrespective of how they would hold up on objective examination: "It is difficult for us to find sufficient qualified cooperation partners in the region"[9] and "The switchover to a new (more flexible and environmentally friendly) process technology is not rewarded by our customers."[10] In addition, there are also large opportunities here for the "sustainability project," as overcoming these cooperation and innovation deficits holds relevant potential for achieving an improvement in the regional situation.[11]

In order to be able to tap this potential, however, it is necessary to know the strengths and weaknesses of the individual companies minutely. Thus an external advisor who wishes to have a supporting function in this regard requires suitable access to the company. The promise: "We will carry out a sustainability project together and thus solve your cooperation and innovation deficits" is not a suitable form of access, since an advance promise of this type cannot be seriously adhered to, nor will it accepted as such by the companies.

Therefore, concrete plans for a company's sustainability approach are required at the beginning which have a reliably high likelihood of leading to visible results within limited periods of time and which can then, step for step, lead via rather ambitious questions to the above-mentioned, more basic questions of sustainability in the regional company context. In this type of approach, it is also important to clarify that the existing self-image of the partner company "Companies are there to make a profit" does not constitute a fundamental barrier to a cooperation agreement in the subject area of "sustainability." In this context, it helps to clarify unambiguously: "It is not the fact that companies generate "profits" that creates the conflicts with regard to a future-oriented development, but possibly the way profits are generated in individual cases."

Practical Examples of Gradual Access

Using examples from the companies participating in our research project, we will demonstrate in the following section how a gradual approach to central issues of company and inter-company sustainability questions can have an impact in practice and where the particular conditions of the economic region come into effect as an area of activity in this process.

Simple "Door-Opener" with Extended Viewpoint

In the course of the project, concrete discussions on the increasing the efficiency of partial processes in small sections proved to be particularly suitable for opening up access to companies and creating a basis of trust for further common activities. An example for such a "door-opening activity" in the context of the project was the material flow uptake in the lacquering area of a medium-sized equipment manufacturer which was aimed at a waste-separating strategy which would optimise costs and be environmentally friendly. In taking such measures, one generally achieves clear win-win situations[12] that are visible as clearly recognisable "successes" in the company's internal sphere.[13]

Networking for Innovations

Against the backdrop of an objective that goes beyond "classical" environmental protection and actually measures the sustainability of companies in the regional economy according to criteria such as ability to innovate, change and cooperate, it is, however, important to take further aspects into account from the start compared with a company's "normal" environmental protection planning:

- Parallel to the concrete solution of the "technical" problems, the integration of the remaining processes of the company's goods output must be taken into consideration in all activities from the beginning.
- Non-technical and non-material processes are to be given equal treatment.
- Optimisation possibilities which have no ecological, but purely economic effects, such as, for example, the reduction of idle periods or tooling-up periods, should also be examined in the same way.

In the above-mentioned example of the lacquering area, this extended viewpoint led to the identification of additional relevant problem areas:

- A high standard of craftsmanship, together with (optical) quality requirements that were not clearly defined, leads to a marked degree of "excessive quality" of the manufactured surfaces.[14] This is reflected especially in the comparatively long pre-processing times, but also in high usage of non-productive materials.
- Since no uniform colour standards could be negotiated among customers and larger systems manufacturers, excess warehousing leads to large amounts of special paint colours requiring disposal.[15]
- Because of a fluctuating and generally low capacity use in the lacquering area, meaningful amortisation cannot even be determined for simple technical improvements such as the use of HPLV injection pistols. For this reason, no investments are made in improvements.

All these problems, which can be found in a similar form in several small and medium-sized enterprises (SMEs), have in common that the respective solution options are not located directly in the production area, but in completely different departments of the company: either in the area of marketing (pricing that is commensurate with production costs and defined quality standards) or in management (possibility of optimising capacity use by marketing the lacquering service externally). In order to be able to tap these optimisation potentials, cross-departmental consultation and negotiation processes are required here that do not take place in the normal course of daily business and for which there is also often no suitable "location" available within the company.[16] Thus the processing of the concrete optimisation project offers an opportunity to initiate an informal, company-internal exchange forum to discuss further areas where there is a need or an opportunity for improvement.

Exchange Forums and Benchmarking Groups

There was a particular attraction in such approaches for a number of company cooperation partners precisely in this "side effect" of wide-scale information access and concrete working contact to company areas which are either located far away or are normally very isolated. This also applies to material flow concepts/systems which particularly aim at increasing the transparency of volume flows in the area of auxiliary materials and making their use lock in almost automatically to the weaknesses identified, for example in the area of lacquering.

In the course of the project, a prototypical computer application was programmed which demonstrates how anomalies in the volume and cost structures of materials consumption can be identified in SMEs too, without installing complete material flow systems, with justifiable time and cost expenditure. In addition, using such an instrument, very flexible key controlling data can be generated which support both an internal period or process comparison as well as the benchmarking of various factories.

Thus, the implementation of the controlling concept outlined above promotes and requires both vertical cooperation between the various company functions – such controlling measures that are structured as tools and very close to processing can only be implemented in collaboration with con-

trollers and employees with a practical function – as well as the horizontal exchange of operation between various factory locations or factories.

Reference experiences with cross-company benchmarking approaches show that they meet with a high level of acceptance and are successfully continued over longer periods of time especially wherever a direct exchange is also ensured regarding the backgrounds for anomalies and improvement possibilities. . One can see from this example the level of proximity and trust required for deep-seated cooperation agreements that are supported in particular by recurring face-to-face contacts in a limited area – the region.[18]

From Efficiency to Innovation Strategy

A further practical area of operation in the overall project was concerned with the introduction of the so-called minimum-volume lubrication in the metal cutting industry. On the one hand, this constitutes an increase in efficiency (and with respect to the problematic cooling lubricants, this can even be by a factor of 1,000); on the other hand, it constitutes a real technological and organisational innovation for the companies, although it certainly can be equally described as the diffusion of an existing technology from an overall viewpoint.[19] A prerequisite for successfully implementing this innovation given the framework conditions of the manufacturing SMEs was in this case an existing cooperation relationship between a university lecturer and a number of metal processing companies located in the region to those who could link up activities in the course of the project. Based on successful experience with cooperation and supported by a number of personal contacts, the pioneering companies risked the conversion of (bottleneck) aggregates relevant to production.

Structural Modernisation and Symmetrical Developer Networks

A discussion about sustainability-oriented product design encroaches even more deeply into company structures.[20] It touches companies at the nerve and requires a very high level of willingness to cooperate both internally and externally and to depart from familiar paths. However, in this field, one also finds the farthest-reaching future perspectives for the sustainable design of product systems that can combine the relevant environmental relief with usefulness for society and commercial success. A number of talks and discussions rounds on this complex set of topics demonstrated that these approaches currently play a subordinate role as “exotic” in most companies in the metallurgy and metalworking industry and that a number of deep-seated changes in organisational flows and in communication paths is necessary in order to give them greater significance within the company. In the course of the project, the term of the “structural modernisation” of a company was coined.

The aspect that practically all truly fundamental changes to the “products” require new forms of cooperation with external partners is especially important in the regional context we are dealing with here. Especially in order to permit the flexible adaptation of complex products to variable customer requirements, stable development networks which are installed permanently are required in which each partner provides specialised, equal-ranking (symmetrical) contributions and in which the cooperation partners can certainly enter into a close mutual interdependence. Both in this commitment, and also in the degree of interaction necessary, they differ markedly from the complementary networks (merger of similar areas in order to be able to process larger orders if required) which are to be found especially in craft trades, or the vertical networks which are widespread particularly in the mechanical engineering sector, in which the system leader passes on completely elaborated production requirements to his suppliers and thus only a small amount of harmonization is still needed thereafter.

It is very important here, too, that face-to-face contacts are made. These are desired by industrial customers, as well as being considered necessary by suppliers/partners, because they facilitate the instigation, emergence and development of cooperation agreements. Many contacts in the various companies formulate this rather fatalistically, saying that the possibility of achieving such cooperation agreements in close spatial proximity does not constitute a necessity for them, but rather a convenience which, albeit desirable, often cannot be implemented in Hamburg.[21]

The Regional Discourse on Spreading Pioneering Achievements

The above-mentioned examples doubtless represent concretisations of fundamental sustainability characteristics that can be connected to the reality of manufacturing SMEs, such as the increase of energy and resource efficiency, the ability to carry out structural modernisation as well as the development of viable cooperation relations. And in many cases, their successful implementation already requires support from the contact and confidence area that constitutes the region.

Nonetheless, the risk remains that these achievements in individual companies will remain singularities in a broad field of "keep up the good work" or that in each new individual case, the long path must again be trodden from process optimisation in small areas up to the new orientations that are more likely to change structures.

Precisely at this point, the regional discourse about the formulation of unifying guiding principles can give the decisive impulse to make "admired precursors" out of "ridiculed exotics."

In order to initiate such a far-reaching sustainability discourse, the role of weighty "promoters" become highly important in the relationship network of the regional participant area. In the concrete case of Hamburg, we fortunately found various persons who adopted this role: an employee of an industrial association which is very well entrenched in the region, who was very open to the cooperation and innovation impulses inherent in "new" topics, a university professor with recognised "problem-solving competence" and equipped with a widespread network of contacts, as well as the chairman of the largest metal foundry located in the region, who also holds important offices as interlocking directorates in the self-government bodies in Hamburg's business sector.

The possible motives for commitment to the intensive entrenchment of the sustainability approach in the regional economy are certainly different. While both employees involved in association work as well as university employees active in research transfer should per se have a fundamental interest in boosting regional cooperation networks, the question arises for a "metalworking company manager" as to the role of one's own product "refined metals" from a strategic viewpoint in a "future-oriented economy," whereby this certainly also has very real economic effects in the short term for a listed company in conjunction with the product image as a "soft" value added factor. In addition, the question of "modernity" and thus also the attractiveness of the home location plays an important role for a large corporation.[22]

With the support of these promoters and others from the regional economy, the initial formation of a "forum for sustainable development" together with the Hamburg Chamber of Commerce was already set in motion in the course of the project.[23]

Thus, after the civil society and the state, the economy will now become the third large social group in the region to also develop its own concentrated opinion formation for the future-oriented sustainability project .

Assessment of the Regional Concept Used

The Hamburg model project's almost exclusively participant-oriented understanding of the term "region" proved itself to be viable under the specific framework conditions of the metropolis region. Precisely the spatial density of the high number of economic participants located in the region leads to the development of large number of confidence relationships between the economic participants that have been active on a face-to-face basis that can be tapped for concrete (pilot) implementation projects for sustainable development. With a company-oriented sustainability concept focusing on the ability to innovate, cooperate and change, the prerequisites for such connectivity could be created.

Furthermore, the multiple overlapping and duplication in these participant networks offer the chance to guarantee the initiated specialist discourse a broad reach with limited additional institutionalisations. However, a three-year project duration is far too short to enable a conclusive evaluation of the implications of the objectives and guiding principles that arise here in the joint discussion between participants in Hamburg's economy. The social processes of confidence-building and reorientation simply require far longer periods.

In addition, the external effect of the "centre of gravity" of the Hamburg economic region could of course only be judged up to now from the initial pilot activities of Hamburg-based companies.[24]

Endnotes

1 According to the regional planning zones determined by Federal Research Authority for Regional Studies and Planning (Bundesforschungsanstalt für Landeskunde und Raumordnung, or BfLR, meantime BBR) as part of its empirical regional research

2 Comp. Dierkes, M.; Hoffmann, U.; Marz, L.: Leitbild und Technik, 1992 (Guiding Principles of Technology), p. 43

3 Acc. to Beischwirtz, R.: Ressourcenproduktivität. Innovationen für Umwelt und Beschäftigung, 1998 (Resource Productivity: Innovations for Environment and Employment)

4 Acc. to Dierkes, M.; Hoffmann, U.; Marz, L.: a.a.O. , p. 41ff

5 Comp. Bukhold, p.: 1991, p. 189-212

6 Powell 1990: 303, citation Kilper/Latniak 1996: 221

7 This is also demonstrated by a current survey taken by Walter, G.: 2002

8 Acc. to Walter, G.: i.e.

9 This problem was mentioned in the discussion about the opportunities and limits inherent in increasing the implementation of a modular strategy of a participating mechanical handling technology manufacturer.

10 This argument was posited during the examination of the opportunities for the increased use of dry processing that reduces both the environmental and product contamination in the metal cutting industry.

11 Thus, for example, using less long-distance transportation, the use of highly efficient production processes in specialised component manufacturers and the creation of highly qualified jobs can possibly achieve improvements in all three sustainability dimensions.

12 Or rather, even win-win-win situations, if other positive results also occur, apart from the environmental and cost-saving effects, e.g. with regard to work security or employee health.

13 That is, they follow the logic of an isolated economy and are also directly visible as a reduction of production costs and materials use in the usual controlling structures of SMEs.

14 Thus, for example, the insides of the casings of mills were lacquered expensively, although this layer of colour was abrasively removed in the test run. Yet "the customer wants a product that is appealing in every way."

15 Paint residue shares of up to 45% of the total amount of paint purchased are taken for granted in production with a shrug of the shoulders, "since after all, Sales/Marketing promises the customer everything." Price advantages for standard lacquering or mark-ups for special lacquer coatings could not be achieved.

16 No routine coordination meetings were held between all the firm's specialist departments in both a number of the small and medium-sized project partner companies as well as among several larger companies.

17 The Newspaper and Environment working group of Lower Saxony's Printing and Media Industry Association is a very positive example of how an intensive, cross-company benchmarking process can operate over many years. Far-

reaching company optimisation possibilities are exchanged in a circle of employees with practical functions who know each other personally beyond the borders of competitors.

18 In the short period of time available for the duration of the project, no such viable basis of trust could (yet) be built up to a sufficient number of comparably structured companies which would permit the implementation of a comparable benchmarking approach in Hamburg's metalworking industry.

19 Innovative new requirements, however, are the standard which was implemented very successfully in partial areas, as well as the fact that practical solutions for problematic alloys (highly refined steel) could be working out and problematic geometrical structures processed.

20 The authors subsume an entire toolbox of measures into this term: from recycling-compatible construction via the increase of maintenance-friendliness and adaptability within the framework of modular concepts right up to completely different (partially dematerialised) products, such as e.g. fleet management or the external provision all warehouse logistics services.

21 Walter, G.: a.a.O, "Cooperation as a general rule belongs to the normality of the working day for the industrial companies we surveyed. The related costs and the inconvenience are accepted as a "necessary evil." "In the end of the day, I spend all my working hours on the autobahn or in the airplane. Although transportation costs do not play a significant role, it would be nice if everyone was located around the corner. Then if any problem arose, one could just travel over there."

22 This is manifested in particular in the question of a sufficient number of qualified specialists in the region, who either as employees of the company itself or as employees of external service providers can ensure high availability and the permanent further development of highly specialised production plants.

23 Groups in the civil population have already worked together successfully for many years in the "Hamburg Future Council". From the government side, the environmental authorities at least made a contribution to the debate which drew countrywide attention with their "Kursbuch Umwelt" (Environmental Timetable).

24 The award of a sustainability prize to publishers Axel Springer Verlag, which is located in Hamburg, in conjunction with the Rio+10 Conference in Johannesburg, is certainly an exceptional case in this regard.

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The Sustainability Link between City Quarters and Regions: Potentials and Approaches for a Regionalized Material Flow Economy

1. Objectives of the Project

The objectives of the transdisciplinary research projects were

- to analyze – as far as possible – all environmental, economic, and social impacts of the new city quarters
- with respect to the goals and indicators used locally to measure sustainability,
- taking into account local, regional, and global impacts,
- so that local actors/stakeholders can identify their current contributions to those impacts,
- and can evaluate their possible future activities with respect to sustainability goals.

The active involvement of local stakeholders, and citizens was a crucial element of the project.

2. Background

Former military or industrial areas (brownfields) offer the chance for conversion into more sustainable (town-)quarters. To substantiate this hypothesis, two model areas were identified: one in the state of Brandenburg (Neuruppin) in the North-Eastern part of Germany, and one in the state of Baden-Württemberg (Freiburg) in the South-West.

By consuming energy, material and land, construction and housing is responsible for a considerable proportion of environmental burdens in a densely populated, high-income country like Germany.

The German national sustainability strategy adopted in spring 2002 emphasizes the need to reduce resource consumption, and land use, as well as greenhouse-gas emissions.

With regard to the influence of different groups of actors on energy and material flows, a distinction can be drawn between the demand side – investors, owners, users – and the supply side – building material manufacturers, building firms, utility suppliers, service providers. The demand side is concerned primarily with issues of sufficiency (sustainable consumption patterns), the supply side with issues of efficiency (sustainable production patterns).

The owners of apartments and houses play a key role in influencing initial (at the construction stage) and ongoing (in the building operation phase) energy and material flows.

The interplay of local actors is crucial for the development and implementation of sustainable cities, and can be addressed on the level of neighborhoods (city quarters). Similarly, this scope also allows to address consumption patterns with respect to regional products.

3. Implementation

The project approach was to extensively research all material flows associated with the building of city quarters, and the living of people in the quarter (energy use, transport, consumer goods etc.). Based on the analysis, an evaluation of various strategies to improve the sustainability was carried out together with local stakeholders.

The project developed a methodology for the extended material-flow analysis, collected local/regional data with support from the local partners, identified local goals/indicators using questionnaires, and in-depth interviews, respectively. Workshops were held in the city quarters to present and discuss the results with citizens, and local stakeholders.

"Round tables" for regional products (wood-based construction materials), and commercial development (firms with regional focus) were initiated in both quarters, and supported in cooperation with the local partners.

Brochures and leaflets were prepared on the results, and the project findings were presented and discussed within the funding programme for the project run by the German Ministry for Education and Research during four "networking" workshops.

The key findings were also presented to local decision-makers who made use of the results in several decisions concerning local investments (see results below).

Local project partners were Forum Vauban in Freiburg, and Gesellschaft für Konversion im Ruppiner Land in Neuruppin, and research partners were complan, and IPU (see contacts).

Funding for the project came from the German Ministry for Education and Research (BMBF). The project supported local partners, and also covered costs for coordination, local dialogue, and publications. Local resources of the partners, and of the Öko-Institut were used in addition.

4. Results and Impacts

The research project identified the impacts of the local sustainability strategies on the new neighborhoods by comparing the city quarters with a hypothetical "reference" quarter without active sustainability strategies.

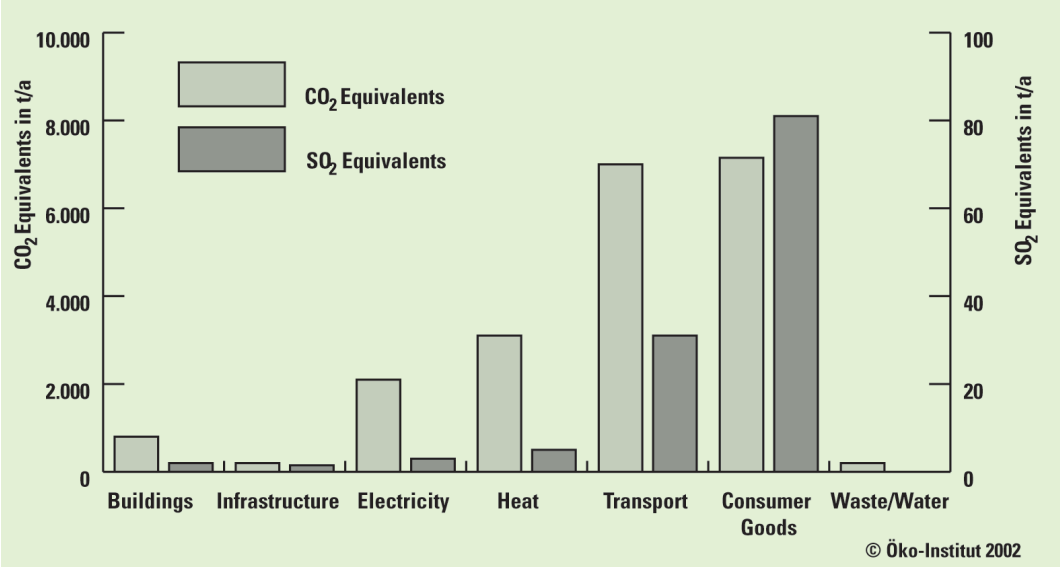
For the comparison, a material-flow analysis was carried out, and the results were characterized by a set of locally adjusted success indicators for sustainability.

Table: Success Indicators – Example for Neuruppin – Vorstadt Nord

Success indicators	Reference	Vorstadt-Nord	–
Share of regional construction enterprises	-	47%	↗
Cars per 1,000 households (within in the quarter)	960	1,160	+21%
Quarter-related green areas (m^2/cap)	29*	27	-7%
Living density (cap/m^2)	0.002	0.032	+1,500%
Share of soil covered (area with buildings, roads etc.)	27%	19%	-30%
Recycling rare of construction wastes	70%	92%	+31%
CO_2 equivalents in t/a	559	277	-50%
SO_2 equivalents (in kg/a)	1,090	238	-78%
Resource use – primary energy (in GJ/a)	7,107	4,346	-39%
Resource use – raw materials (in t/a)	1,233	138	-89%
Residential wastes (kg/cap)	303	321	+6%
Water use (l/cap*d)	129	98.7	-23%
Offer of products from fair trade	No	No	→
Share of "environmental mobility"	24 %	14 %	-42%
Barrier-free/disabled-friendly buildings	1%	0	↘
Attended dwelling/living for all target groups	No	No	→
Leisure time/non-school educational offers for kids & youth	No	No	→
Infrastructure for self-organized processes	No	No	→
Play streets (share of streets in the quarter)	-	0	→

The sustainability "profile" clearly shows successes, but also areas without improvement (weak spots). In addition, the research project also identified the total environmental effects from all activities in a city quarter – from constructing/renovating the buildings, implementing the infrastructure, heating houses, local transport etc. to water delivery, waste treatment, and consumed goods.
The results of this analysis is shown in the following for Freiburg-Vauban.

Figure 1: Environmental Effects of All Material Flows in Freiburg-Vauban, Including Upstream Life-Cycles



Besides the quantitative results offering orientation on past successes, and future fields of action, the work resulted in:

- Switch to more sustainable energy supply options in both city quarters (gas-fired cogeneration, and biomass cogeneration, respectively)
- Implementation of local policies to encourage use of renewable, as well as regional materials for buildings
- Implementation of local policies to encourage strict energy efficiency codes for new buildings
- Support for policies to give priority to renovation/refurbishment of existing buildings
- Creating local consciousness regarding the role of consumption of regional goods

As a key innovation, the use of small-scale biomass cogeneration is now demonstrated in one city quarter (Freiburg-Vauban) using regional wood wastes as a fuel, and a steam engine for cogeneration.

In addition to the local activities with respect to energy use and transport, the projects also researched the possibilities of a more regionalized consumption strategy of the residential customers in the city quarter of Freiburg-Vauban.

For this, the various goods consumed in Freiburg-Vauban were identified, and potentially regional products were also researched. Examples were selected building materials (timber, chalky stone), and selected food products (bread, milk, cheese).

To determine the potential economic and ecological gains from regionalized products, the current consumption of "typical" products – assuming statistical average households, and the national mix

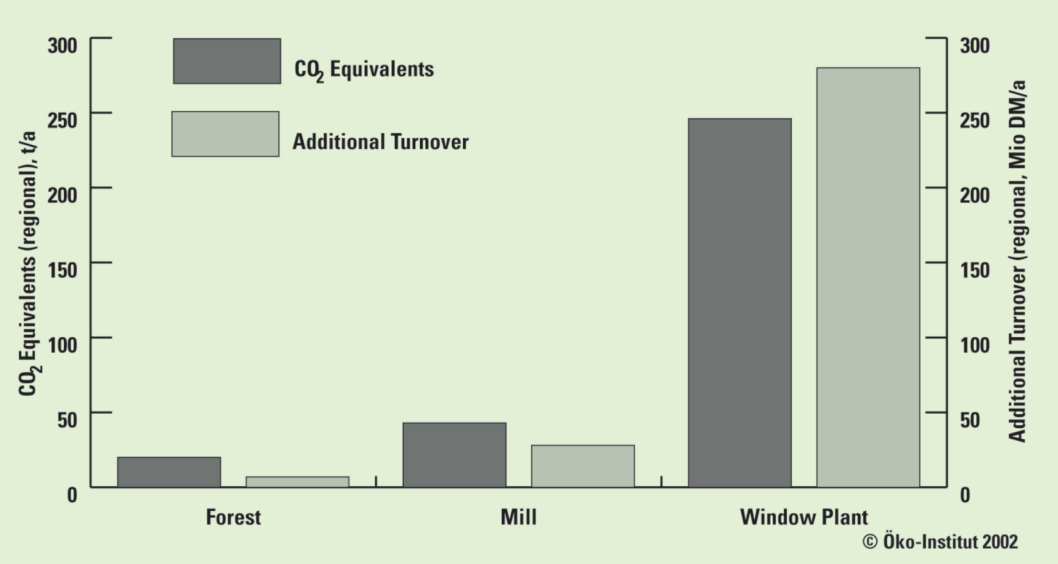
in the production and delivery of products (including imports) – was compared to products from the region, and – for food – also from ecological production.

The demand in the city quarter is converted into a mass flow delivered by a process chain from the national production mix (reference case), or a regionalized production system (regional case).

Besides the environmental impacts, this approach also allows to track the economic effects by calculating the differential in regional economic turnover, using the prices and costs for the products, and the disaggregated bottom-up modeling of the regional production.

With respect to regional construction materials, the following figure shows the results for wood-framed windows – it is assumed in the calculation that all windows in Freiburg-Vauban would be bought from regional suppliers.

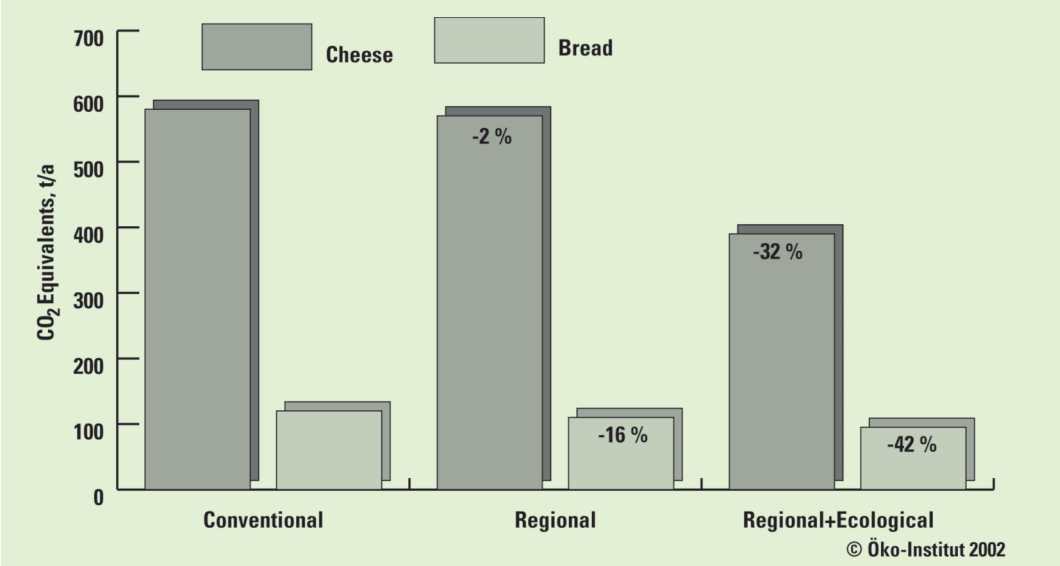
Figure 2: Regional Greenhouse-Gas Emissions and Additional Economic Turnover from Timber Products in the Freiburg Region



As can be seen, the additional regional economic turnover would increase significantly, especially in the regional window manufacturing plant. In parallel to the "re-routed" economic flows, also the greenhouse gas emissions are shifted to some extend into the region – still, their total is lower for the regional product than the emissions from the average wood window in Germany which mainly comes from imports from the USA, and Indonesia.

With respect to regionalized food – here, the examples of cheese, and bread are shown – the following figure gives the results of our analysis with respect to conventional (average) products from the national production mix (including imports), a regional strategy, and the regional strategy plus ecological production.

Figure 3: Comparison of Greenhouse-Gas Emissions from Food for Three Strategies

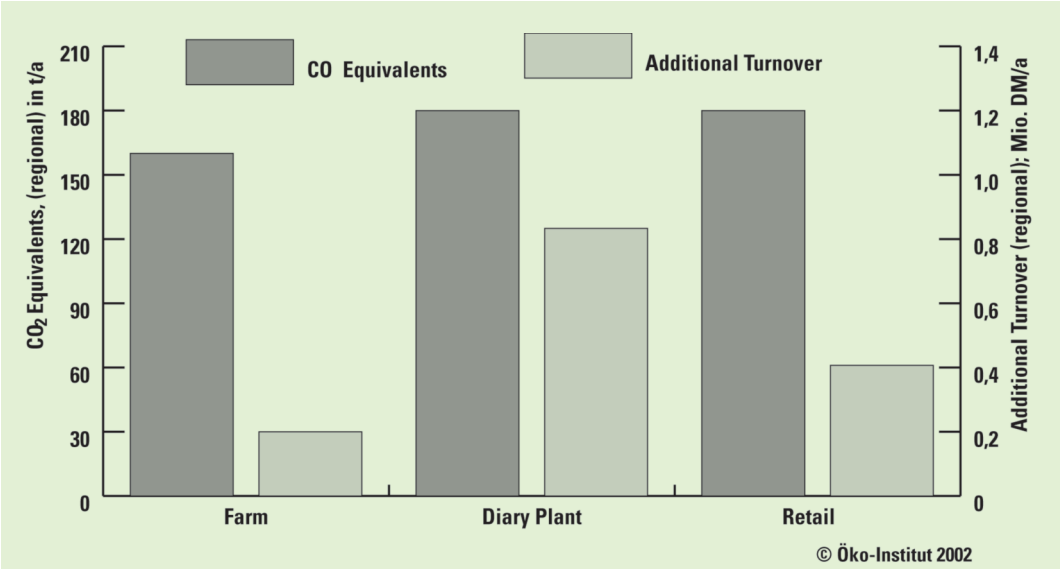


This clearly shows that for food, "regionalization" results not necessarily in large environmental benefits – only if ecological production (organic farming) is added to the strategy, emissions are reduced significantly.

Still, regional products in general have lower environmental burdens, and shift economic benefits significantly to the region.

With respect to cheese from regional organic farming, the following figure shows this effect – the additional economic turnover is the differential to the regional turnover in the reference case, where cheese from the national production mix (including imports) is consumed in the city quarter.

Figure 4: Regional Greenhouse-Gas Emissions and Additional Economic Turnover from Eco-Cheese in the Freiburg Region



The increase of the regional economic turnover is especially large for the regional diary plants, and the retailers, while for the farmers, only a smaller share is gained. The parallel shift of greenhouse gases into the region is distributed more evenly between the economic actors – and in total approximation lower than in the reference (national mix) case.

Based on these results, the potentials for a regional "material flow economy" were made visible for the local actors in the city quarters.

The quantitative analysis was used locally to engage further stakeholders (i.e. regional economic actors) in a network of "sustainable housing" (in Neuruppin), and "regional products" (in Freiburg-Vauban).

5. Barriers and Conflicts

The approach to "measure" success of local/regional activities using material-flow analysis takes time, and good results depend on the availability of and access to adequate data.

The creation of scenarios for future activities needs a participatory approach, so that local actors/stakeholders must invest some time. Barriers to implement results were:

- Time needed for successful outreach to stakeholders in the commercial sector
- Willingness of commercial developers to engage in local activities
- Resources available for local coordination work ("network node")

6. Transferability

The project approach (methods) is fully transferable to other city quarters, cities/municipalities, and regions.

The software tools can be easily adjusted to local conditions, and are available at no cost through the internet. The software is multi-lingual, and has already databases for various countries.

7. Lessons Learned

A real participatory process for new city quarters needs extra resources and has to include both planning and implementation. To be successful, a network node (intermediate actor) is needed and should receive longer-term public support for its work.

The intermediate actor will also be an interface between citizens, economic actors, and the municipal administration. Private sector involvement in sustainable neighborhood development is crucial for success, and the intermediate actor can facilitate such interactions.

Material flow analysis with the extension to economic impacts is able to increase the transparency of local action, and to support participatory decision-making, and multi-stakeholder involvement not just within the city quarter, but also within cities, and their surrounding regions.

8. Additional Information

The project was completed in late 2001. Key project results are currently implemented locally by the project partners, some of the findings were already taken into account by local decision-makers (e.g., refurbishment of existing buildings, district heating, biomass energy, promotion of regional products).

The final report with an English summary will be available in late 2002, as well as a brochure. All software, reports, presentations etc. are available on the project website.

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Regional Inter-Company Energy Supply Concepts as an Option for Cleaner Energy Production – Potentials and Barriers

1. Introduction

Within the debates on sustainable development, under discussion since the end of the 80's, the saving of resources and the prevention of emissions have been regarded as fundamental prerequisites for a sustainable development. Due to many social, ecological and economic challenges directly related to the energy sector and in particular due to the relevance of emissions related with energy supply, the energy sector may be regarded as an important area of action for sustainable development.

Within the energy supply sector the industrial energy supply is an important area of conflict of different interests, claims and problems. For the supply of different forms of energy (electricity, steam, cooling, compressed air, etc.) shall be at the same time environmentally friendly (with minimised emissions and minimised use of resources), cost-effective, and with a high supply guarantee.

The current energy supply of industrial companies is by virtue of its high absorption of fossil energy resources and its emissions a major determinant of sustainable development within industrial production. In this context, a promising approach to reduce generation costs as well as negative impacts on a company's contribution to sustainable development is represented by inter-company energy supply concepts (synonymous: energy networks) which are characterised by a co-operation of companies for the joint utilization of power and steam generation facilities. Options thereby are the connection of energy flows, such as steam supply, or the joint use of a cogeneration plant in which power and steam are produced for the companies involved. The advantages of inter-company energy supply concepts arise from the exploitation of economies of scale, the compensation of energy demand curves and the utilization of waste heat. Hence, the concept of inter-company energy supply is similar to resource recovery networks (synonymous: Eco-Industrial-Parks) with the main difference being that only energy flows are interconnected in the energy network whereas resource recovery networks typically feature material flows which are residues of the production process. What the both concepts do have in common is the spatial proximity of the network participants and the potential to enhance the companies' sustainability performance. Analogous to the integrated approach of Supply Chain Management, economic and ecological advantages can be obtained from implementing an optimal inter-company solution instead of several intra-firm optima.

2. Specifics and Chances of Inter-Company Energy Supply Concepts

One of the findings of the World Energy Assessment [10] is that the current path of energy use is not compatible with key elements of sustainable development. But although energy supply of industrial companies is an important source for emissions, there are only a few inter-company concepts focusing on cleaner energy production of industrial companies (see e.g. [2], [6]). A survey of the potential for integrated eco-industrial parks with co-generation, energy cascading and recycling across Canada can be found in [9]. In contrast to inter-company material-flow management, where some theoretical and practical work especially in the field of industrial ecology [3] exists, there is hardly any practical experience in inter-company energy-flow management between production firms until now. Unfortunately there are some fundamental differences between inter-company energy flow management and inter-company material flow management due to specifics of energy flows. First of all, certain kinds of end use energy (in the following, the general term energy will be used instead the more precise term end-use energy), e. g. electricity and process heat, can hardly be stored, necessitating a

simultaneous electricity production and demand. Furthermore, linking energy flows often requires the installation of specific hardware such as steam pipes, resulting in considerable investments. As these investments – as well as heat losses – increase with the length of the pipeline, linking heat flows in an economically and technically feasible way calls for a close spatial proximity of the sites in question.

On the other hand, inter-company networks have gained an increasing importance in business practice as well as in recent literature because of possible competitive advantages:

- The liberalisation of energy markets opens up new chances for inter-company energy supply networks, for instance purchase on spot markets and risk minimisation by hedging strategies. Especially by bundling energy demand of different firms, lower energy prices can be achieved on the markets.
- Bundling energy demand of different firms might also lead to a more even load curve which could result in a higher utilisation factor of the installed capacities.
- Energetic units financed jointly by different firms can help to avoid the problem that investments in such units often do not meet the pay-off times of one to three years required by many industrial companies. This is especially true if an inter-company energy supply concept is realised as a contracting project, offering the possibility to shift financing issues, several project risks and possibly operational issues to a third party with specific know-how in this area, e. g. an electric utility.
- Inter-company energy supply concepts can lead to the exploitation of economies of scale.
- Finally, inter-company energy supply concepts could result in a cleaner energy production e. g. by the joint installation and utilization of generation facilities or the connection of waste heat flows in order to use this heat in other companies.

3. Different Barriers of Inter-Company Energy Supply Concepts

Even if there are economic and ecological benefits resulting from an inter-company energy supply concept, a successful completion of such projects is prevalently hindered by different barriers. These barriers can be classified into two main groups: general restraints for inter-company co-operations and barriers due to special situation of the energy markets and especially of cogeneration. Additionally to these barriers on a company's level also barriers on a personal level [5] can be observed.

3.1 General Restraints for Inter-Company Co-Operations

Cognitive Barriers

In addition to a lack of information regarding potential partners, there is often a great degree of uncertainty concerning the benefits and expenditures of inter-company concepts.

Energy and Mass Flow Difficulties

Due to a lack of quality, continuity and quantity of flows to be connected the risk of introducing new bottlenecks in the procurement process arises. To reduce this impediments, it is indispensable to integrate flexibility potentials when elaborating the concrete technical solutions of inter-company concepts (e.g. by using modular units). Another possible solution is to install backup plants, so that the firms are able to produce even when the inter-company energy supply fails to fulfil its intended function.

Insufficient Matching
To realise co-operative concepts, the investment cycles of the partner companies as well as their organisational structures have to be brought into line.

Allocation Difficulties
The problem that the costs and the revenues of the inter-company concept have to be divided among the co-operating firms has to be solved. To tackle similar problems, game theoretic approaches have successfully been used in other areas [7]. In the specific case, the problem of allocating the costs and revenues to the partners of the inter-company network is getting even more complex due to the fact that some of the inter-company energy supply concepts produce electricity and steam in cogeneration.

Fear of Dependencies
Apart from the problem of sharing confidential information, one of the most important barriers to inter-company concepts is the fear of dependency on partners and the loss of control of resources and decisions. Inherent risks of a network in general consist of a only partial control of the whole system, the threat of losing competencies and know-how as well as the possible dependency on the partners (see e.g. [6]).

This survey of possible obstacles shows that the problem of insufficient trust has to be dealt with in co-operations. In the specific case of inter-company energy supply concepts, which is characterised by strong dependencies between the involved companies, trust between the partners is even more important, as the network might totally disband if one partner leaves the co-operation.

3.2 Barriers for Co-Generation

Beside some general restraints for inter-company co-operations mentioned above barriers and obstacles can be observed which are specific for the energy sector and especially for cogeneration and not dependent whether these options are realised within one company or within a network. Typical problems are e. g. unsettled legal framework conditions for certain energy supply technologies (such as cogeneration, renewable energies) in liberalised markets, administrative barriers or public opposition, especially from local residents, which may impede the development of inter-company energy supply concepts.

The German energy markets are currently reorganising and sometimes electricity purchase prices do not even cover the energy utilities' variable costs, so the adverse basic framework inhibits an expanding use of cogeneration. The uneconomic situation for (new) cogeneration plants in the liberalised electricity market has substantially improved, since the cogeneration law has become effective on 1st April 2002. Due to the fact that cogeneration is an important option for a further reduction of CO2 emissions there are also some efforts to promote cogeneration on a European level (e. g. Directive of the European Parliament and of the council on the promotion of cogeneration based on a useful heat demand in the internal energy market from 22.7.2002).

Another very important problem specific to the energy sector is the long period of repayment. As a result of industrial companies demand short amortisation times for investments, even if these investments in inter-company energy supply concepts might be promising considering other economic and ecological criteria, new forms for the realisation of investments in energetic solutions have to be found. One possibility to realise such projects jointly could be a special form of co-operation between the involved actors, known in the energy industry as contracting. Contracting describes a general agreement in which a contractor takes over different tasks such as financing, planning, building and maintenance of the plant. The contractor also commits itself to supplying the necessary energy flows.

Depending on the complexity of the project, the technical and financial services can be provided either by a single contractor or by a contracting consortium.

3.3 Personal Barriers

Personal Barriers to inter-company co-operations are related to individual resistance against an increased regional orientation in organisations. Such personal barriers may be subdivided in cognitive, motivational and situational barriers.

Cognitive Barriers

Since neither the underlying concept nor potential strategies for regionalization or their possible positive consequences for sustainable development are widespread within industrial production, cognitive barriers (e. g. lacking knowledge of the concept of sustainability, lacking measurability of sustainability) represent a considerable obstacle.

Motivational Barriers

There are motivational barriers on a personal level which relate to the fact that regional business concepts might fail because they are not in agreement with personal objectives of decision-makers (although possible options are known within the company in question).

Situational Barriers

Resistance on a personal level comprehends situational barriers such as the workload of alternative tasks and pressure of time.

4. Experiences from a Case Study

An example for such an inter-company energy supply concept is a study on the co-operation of 2 companies with both a high steam and a high power demand and an energy supplier. This pilot project has been supported by the German Ministry for Education and Research (BMBF) and aims at identifying economic, ecological and social effects of inter-company energy supply concepts, which are based on existing energy supply facilities as well as on investments in new facilities. Apart from organisational aspects such as the co-ordination of the inter-company network, the economic and ecological assessment of options in network projects with an extensive investment demand has been a highly important issue requiring an adequate methodological approach.

4.1 Methodology

Therefore the following multistage methodology has been elaborated in interdisciplinary team work: The five-step methodology is based on a simultaneous investment and production model (*PERSEUS*: *P*rogram Package for *E*mission *R*eduction *S*trategies in *E*nergy *U*se and *S*upply) using a mixed integer optimisation approach. This optimisation model has been complemented by the process simulation software Aspen Plus [1] to determine the necessary data of future investment options and by the life cycle engineering software GaBi 3 [4] to calculate the ecological effects resulting from different energy supply strategies.

4.2 Results

By applying the whole methodology to analyse inter-company energy supply concepts in a network of production companies located in Karlsruhe, the practicability of the method has been shown. Therefore, in the framework of this case study the process simulation software Aspen Plus has been used to adapt the following inter-firm energy supply concepts to the specific circumstances of the case at hand:

- different natural gas fired combined cycle power plants (CCPP) for electricity and heat production (cogeneration),
- diverting unused energy flows from one company into another company to meet the demand for low temperature heat,
- the use of geothermal energy for the production of electricity and process steam and
- the installation of a combined heat and power plant fired with biomass.

Applying the developed PERSEUS-model for the techno-economic analysis of the energy systems of the firms involved, the reference case with a still separated energy supply has been compared with the possibilities of a subsequent inter-firm linking-up and the erection of new plants. The analysis' results show an improvement with both renewal of single plants and inter-firm options compared to the forecasted development of the reference case. The economically optimal solution is the construction of a central combined cycle power plant ($CCPP_{all}$) to meet the electricity and steam demand of the companies involved.

The second best solution is the construction of two local CCPPs power stations for inner-company steam supply. The central plant ($CCPP_{all}$) has economic advantages mainly due to some effects of economies of scale like lower specific investment and overhead (labour costs, insurance rates etc.).

Due to the fact that such strategic decisions of investments affect the energy systems of the firms involved for several decades, possible repercussions of changing framework conditions had to be taken into account. For this reason, uncertainties have been considered by evaluating different scenarios. This scenario analysis shows that the economic attractiveness of $CCPP_{all}$ compared to the business as usual case depends on the one hand on the assumed development of the price for natural gas. On the other hand the central power plant $CCPP_{all}$ is always superior to the different local combined cycle power plants

Environmentally the central combined cycle power plant ($CCPP_{all}$) is superior to the reference case, too. Thereby, the central plant proves itself as the best option, concerning both integrated consideration and local emission load. The central plant's total contribution to environmental relief and spared resources equals the annual primary energy consumption of 140,000 cars, respectively the environmental wastage (greenhouse effect and eutrophication) of a town with about 45,000 citizens. The main reasons for these emission reductions are a higher contribution of natural gas to the primary energy carrier mix and especially the higher efficiencies of the natural gas fired combined cycle power plant ($CCPP_{all}$) compared to the average efficiencies of the power plants currently in use.

Finally it has to be stated that this analysis has focused on the technical and economic dimensions of inter-company energy supply concepts. In order to cover all dimensions of sustainability an even more comprehensive perspective involving also social aspects is necessary.

5. Conclusions

Summarizing, one has to state that although there are promising approaches to regionalization within the field of industrial production, such as industrial parks, resource recovery networks or inter-company energy supply concepts, which boast huge potential to support sustainable development in industrialised countries these approaches are being realised only rarely. The focus of this article is on the energy sector especially on concepts of inter-company energy supply concepts which may contribute to meeting emission reduction targets and minimising the use of natural resources by linking energy flows. However, the practical experience gathered in this field has been limited up to now. One important explanation is the existence of numerous barriers to regional business concepts in general and barriers to inter-company energy supply concepts in particular. In order to derive a set of measures to overcome these barriers they may be classified into barriers on company's level, barriers of energy markets and cogeneration, and personal barriers.

Consequentially, even though there are economic and ecological benefits resulting from inter-company energy supply co-operations, organizational concepts have to be found that guarantee the stability of the co-operation even if the framework conditions are changing, e.g. because one partner leaves the network. In addition, to enforce cleaner energy production by cooperative measures confidence between the partners is needed due to the fears of each single partner to lose competencies to the other partners.

Finally, it can be concluded that the effort required to build a network of several companies is often underestimated. The creation of such a network can however only be successful through the intensive co-operation of all parties involved. Despite adverse general conditions (e.g. caused by the liberalisation of the electricity market) being mostly observed for a successful implementation of inter-company energy supply concepts it is necessary that netting options can be identified, which are of interest for the network of industrial partners.

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Networking for Innovations

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Limits to Regionalisation

As the above contributions demonstrate, a regionalisation of economic activity is in many circumstances a sensible and promising strategy on the road to greater sustainability. However, reducing the size of economic cycles and consciously restricting oneself to a single region will not prove successful in every case.

The strategy of regionalisation has limits that one should take time to consider. These limits can have socio-economic reasons: for example, a concentration upon economic activity within the region can become difficult if there are pronounced asymmetries between neighbouring regions. This can happen if, on the one hand, one has regions of robust economic growth with strong inward migration with, on the other hand, adjacent regions that are in decline, such as old industrial regions which many people are moving away from, as is currently the case in large parts of Eastern Germany.[1] In such cases, and from perspectives of sustainability, an inter-regional division of work might make sense if it does not enshrine developmental asymmetries and injustices in terms of distribution, but instead leads to the implementation of functioning balancing mechanisms.

However, the limits to regionalisation can also have a physical basis. Nevertheless, unlike the limits that are due to socio-economic factors, it is astonishing that until now these physical limits have not been systematically included in the debate.

'Resistance to Distance'

These physical limits to the regionalisation strategy are thus the focus of our further deliberations. What we are dealing with here are limits inherent within the economic process itself, and particularly within products, because in the very products that are manufactured, traded, and consumed there are examples of 'resistance to distance'. These elements of 'resistance to distance' vary in magnitude, and hinder or promote the regionalisation strategy.

What is meant here by 'resistance to distance' is that a product possesses one or more attributes that influence the distance within which this product can be manufactured, traded, and consumed. There are some indications that this 'resistance to distance' is product-specific and primarily of a physical (material) nature.

Possible examples of 'resistance to distance' that in principle can prove to establish the 'natural frontier' of any regionalisation are:

- Direct physical losses via transportation. A classic example of this is the loss of electricity in the use of electric cable. The longer and thicker the cable, the lesser the electrical energy that is delivered to the consumer.
- Physical losses as a result of infection and pollution. The standard example of this in the regionalisation debate is the transport of fruit and vegetables within the European Union. For instance, the further fruit is transported, the higher the risk of fungal infestation, such as rot. This too can be traced back to the product's inherent attributes, such as a susceptibility towards corresponding pathogens or ecological enemies.
- Looked at in a certain way, the effort involved in the transport of (heavy) mass-produced goods can also be seen as an example of 'resistance to distance'. Thus as a rule one finds that ubiquitous types of soil, gravel, and sand are not traded on a nationwide basis, particularly if there are no available options in terms of transportation by ship or rail.
- Likewise, the effort involved in the transportation of heavy packaging material (such as returnable glass bottles) might also prove to be an example of 'resistance to distance', as is demonstrated

when one takes stock of the ecological impact of different types of packaging. In addition, when it comes to the transport of extremely bulky goods (such as heating insulation foams made of polystyrene or polyurethane), their inter-regional economic potential is in principle limited by the expenditure of large amounts of money and energy.

Complexity as an Additional Relativisation

It is striking that the examples we have just mentioned all refer to products that are not very complex. Products' physical 'resistance to distance' is obviously relativised if they are of greater complexity.

A paradoxical effect can be observed here: one would actually assume that the various instances of 'resistance to distance' inherent within the different materials comprising a product would add up or even multiply. Nevertheless, the opposite seems to be true. This can initially be traced back to the fact that productions involving greater complexity cause the product to become decreasingly ubiquitous, so that this can lead to demand from a wider area, thereby compensating for these cases of 'resistance to distance'. However, the elements of 'resistance to distance' are also similarly relativised if there is greater range of manufacture (with no increase in complexity).

When it comes to complex products, there is also the question of whether all the stages in the value-added chain are actually susceptible to regionalisation. This can be illustrated via the example of paper manufacturing. There might be potential for regionalisation at two points here: production and recycling. It is conceivable that production sites should be situated in local proximity to the most important 'sources of raw materials' – in this case one should chiefly mention water and wood. Yet according to Baccini and Bader (1996: p.56 ff.), used paper likewise forms an important part of production. If one then wanted to regionalise recycling cycles, one would need to bear in mind that some of it flows back into paper manufacturing, some of it is burned as waste to generate heat, but some of it is also incorporated into recycling chains. Viewed from the perspective of regionalisation, regional cycles could be set up in regions with their 'own' paper production sites as well as in those with their 'own' recycling operations.

Closely linked to the question of which stages in the creation of added value can be regionalised is the question of where one sees the 'frontier' of regional economic interconnections. According to Bätzing (1998), so-called endogenous/exogenous dual uses (cf. also Ermann 1998) should lead to the realisation of endogenous/regional potentials that are defined as the attributes of the region and the totality of all the opportunities to act that are open to all players within a region; for example, so as to obtain income that remains within the region. Yet at the same time one should not pursue any 'sealing off of the borders' towards areas outside the region; instead, (exogenous) potentials from such areas (for example, in the form of tourism or local recreation) should likewise be made use of (cf. Ermann 1998, pp.16 & 72).

Work at the Limits of Regionalisation

Although the physical instances of 'resistance to distance' are specific to various materials and substances, they do not constitute inalterable product attributes. It is far more the case that they can be technically relativised by changing the product's material composition.

Stefanie Böge's study in 1995 looked at the famous strawberry yoghurt which, contrary to common beliefs, is produced on a nationwide basis involving transport over vast distances (cf. also Lovins et al. 1998). Nonetheless, despite its average range of manufacture and complexity, it is in no way the kind of product with singular USPs that would justify its nationwide production and exploitation. This yoghurt competes on supermarkets' national and international dairy counters with many

similar products. It is evidently the case that if one employs optimised logistics and manipulation of 'resistance to distance', it is also possible from an economic point of view for effects of scale to cancel out the physical limits to regionalisation and their logic.

For example, perishable goods where there is a danger of infection via fungi and other micro-organisms and so forth can be treated in order to enable their transportation over greater distances. These preservation processes are chiefly of significance when it comes to food. In terms of food, a classic procedure to achieve this is pasteurisation, which was initially employed to lengthen the time between infection with germs to the point where the goods are ruined, but which also clearly reduces 'resistance to distance'. A similar effect is achieved via the establishment of cold chains when transporting goods; as a result of lowering the temperature, micro-organisms reproduce less and are slower to break down the substratum, so that the item stays 'fresh' longer. In addition to preservation, one should also mention treatment with chemicals here, where the micro-organisms are likewise destroyed (with fungicides for fruit that perishes easily, such as strawberries, with chlorine dioxide or other chemicals for drinking water, or with carbon dioxide for mineral water). As these examples illustrate, measures of this kind are especially customary when it comes to food.[2]

The counter-measures mentioned not only reduce the goods' 'resistance to distance', but at the same time postpone their sell-by date. They thus extend the products' performance range in terms of both distance and time. This requires the not inconsiderable deployment of energy and materials. One must assume it is this two-fold effect (the extended expiration date of the product and the extension of the area within which it can be marketed and consumed) that ensures that such manipulations of 'resistance to distance' are undertaken relatively often when it comes to perishable goods, even if the products become more expensive as a result of the greater use of materials and energy. Yet as a rule, the cost increases occur in dimensions that do not play a major role when compared to the total price.

The Acceptance of 'Resistance to Distance'

Instances of 'resistance to distance' are only generally accepted where they are so great that the outcome is that products can only be marketed locally. This is the case when it comes to district heating (hot water and steam), where transportation across greater distances renders the utilisable difference too small to achieve an economically viable result. However, it is only when it comes to the forms of energy that have been mentioned that the examples of 'resistance to distance' are that large.[3]

Up until now, only a few businesses have been engaged in implementing a regionalisation strategy where examples of 'resistance to distance' are suitably taken into account. It is well known that the principles of the economic use of resources have still not made any relevant inroads into large sections of business practice. It is therefore best to explain that on the one hand we are faced with such far-reaching manipulations of 'resistance to distance', while on the other hand we can see the conscious acceptance of the losses incurred as a result of 'resistance to distance' (such as in the energy and construction industries).

In both the pursuit of the strategy of regionalisation as well as in those strategies that are currently still commonly used to overcome instances of 'resistance to distance', there is an interaction of natural and social dimensions: one can deliberately seek or overcome the spatial proximity of extraction and exploitation (for example, wood, gravel, and sand). The same is true of the spatial proximity of exploitation and recycling (for example, when it comes to used paper, electronic waste, and so on). Yet it is virtually impossible to describe this using nothing but a set of economic tools, and it thus eludes a perspective that adopts a purely economic slant.

Up until now, manipulations of 'resistance to distance' (wherever possible), or ignorance of it, have been the norm in terms of widespread economic practice. By contrast, conscious acceptance of 'resi-

Generalizations

stance to distance' is the exception, obliging an economic player to go to great lengths to seek new partners in their region. However, it doesn't just require conscious decisions in a company and the establishment of cross-business networks. When dealing with 'resistance to distance', one must additionally take into account the demands and expectations consumers have of products.

Among various target groups of consumers, it is for example possible to assure an extremely variable acceptance of preservation techniques. For instance, the chlorination of drinking water is rejected by wide sections of the public on taste grounds (whereas the treatment of water with UV rays is evidently not a matter for discussion). The addition of carbon dioxide to mineral and table waters is not recognised as a preservation technique. This similarly applies to preservation with Vitamin C, and the food industry is duly exploiting this fact; premium varieties of lettuce and other products for specific purchaser groups are therefore no longer being treated with benzoic acid, but with Vitamin C instead.

In the consumer's mind, the aspect of freshness is also increasingly competing with the aspect of convenience, as is for example apparent in the market from the success of frozen foods, even in the area of organic food.

As a consequence, instances of 'resistance to distance' can be relativised in various ways and to differing extents. Manipulations of 'resistance to distance' are only partly accepted on the part of both consumers as well as industry and commerce. When it comes to relativisations of instances of 'resistance to distance', it always leads to compromises between:

- economic and technical feasibility,
- socio-cultural desires and expectations and
- the physical nature of the object.

These compromises are not always definitely sustainable, even if they touch upon the essential dimensions of sustainability.

Outlook

It is becoming clear that ignorance of 'resistance to distance', or its relativisation via corresponding product design, are only partly accepted and/or discussed by the public. However, this fact also implies a potential for action that can easily be used for processes of sustainable economic activity, such as product innovations or the establishment of regional exploitation networks.

Presumably, this will frequently not involve a blanket consideration of 'resistance to distance' in the economic process. However, a consideration of 'resistance to distance' that is economically as well as socially and physically appropriate, albeit relative, can contribute to the creation of a new 'clarity' – for example, within value-added chains or in recycling networks. In this way we can arrive at a common (cross-business) orientation towards efficiency, but also consistency. Ultimately, if one deals appropriately with instances of 'resistance to distance', it is also possible to thus achieve more sustainable economic activity.

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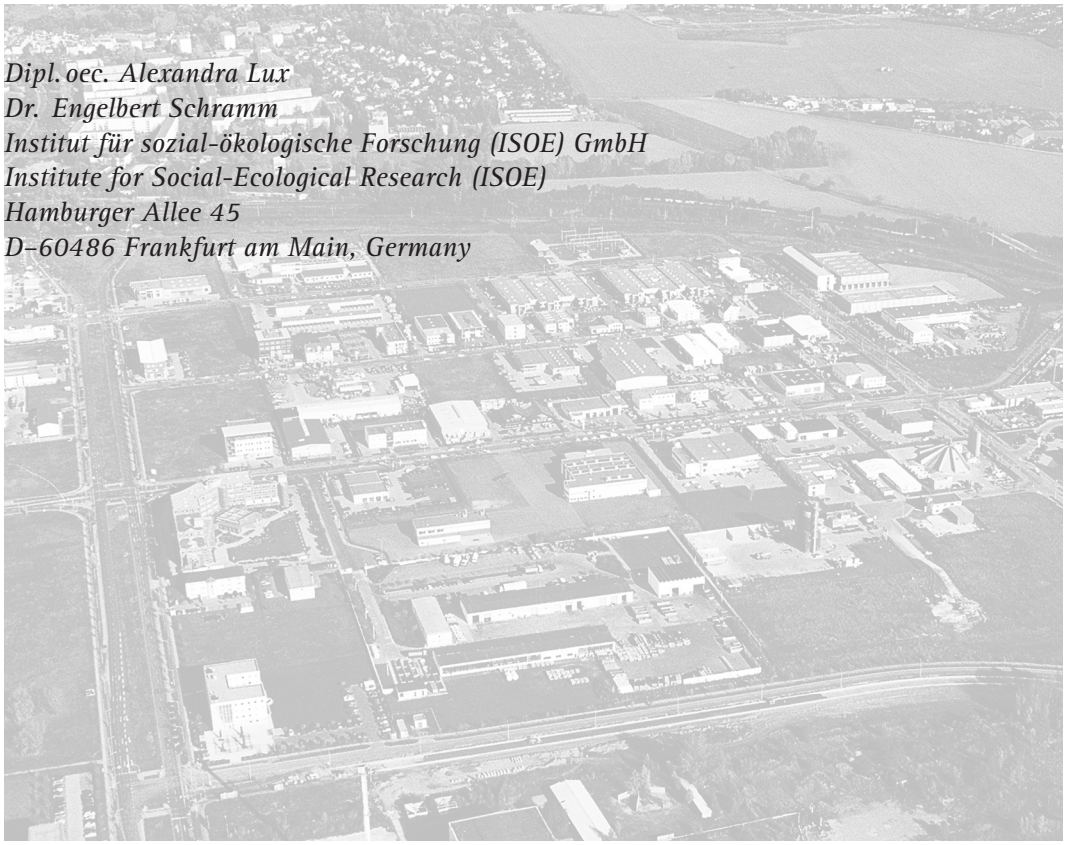
Endnotes

1 However, there are also countries where a similar juxtaposition of differently developed regions has been in existence right from the onset of industrialisation. In the past, this has frequently produced regional conflicts in such places: for example, in the Languedoc region of France, or in the Mezzogiorno region of Italy.

2 Although similar methods to extend the life of the product are also applied when it comes to other classes of products (e.g. consumer items such as toothbrushes, or in the case of textiles too), this is not accompanied by any change in the 'resistance to distance'.

3 In the energy industry, this often means that energy-producing plants which also see the occurence of forms of energy with a high 'resistance to distance' (e.g. combined heat and power) are not established, or these forms of energy are declared from the outset to be waste heat and are removed without being used.



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On the Suitability of Industrial Regions for Implementing Sustainable Development Strategies. The example of Material Flow Management

1. Introduction

Industrial regions can primarily be categorised as demarcated from their surroundings through a high level of industrialisation. The characteristics underlying their structure is therefore not only an above-average intensity of economic activity per area of land, but also, in particular, the comparatively high level of materials utilised as a basis for manufacturing within such industrialised sectors. Prominent examples of such regions include the Ruhr district, the Black Country in England or the Bassin Houillier in France. Each has a traditional coal and steel base. Others include the Turin, Hamburg or Munich conurbations, as well as the Basle/Lörrach/Mulhouse region where three countries meet – or the interface between three Federal German states in the Rhine-Neckar region. Accordingly, industrial regions in Germany or western Europe currently include examples that have been suffering from serious structural crises for a number of years, as well as those enjoying burgeoning and stable dynamic growth. The latter group includes the last two regions listed – in spite of their having been dissected by high-ranking, if not the highest-ranking administrative boundaries for decades, or even centuries. Does this not serve to support the theory that industries fashion their own regions – and always have done? Also, that this even occurs across borders as soon as appropriate latitude is granted them politically? Does it not also add weight to the conjecture that the prosperity of an industrial region is essentially governed only by classic economics, whilst voices of social and ecological considerations would be best placed merely observing actual events and developments from behind the scenes – in order not to diminish the market's efficiency in conserving resources? Should not investments promoting transformation processes orientated to sustainable development then be categorised as long-term subsidies justified, at best, in social and ecological terms? Additionally, if such a justification is deemed insufficient: Which driving forces could and should be utilised to implement improvements or even transformations towards a more permanent form of sustainable development of our current economic system?

Actually, there are many indications that industrial regions themselves are not only capable of providing or developing potential solutions to problems, but that they additionally have at their disposal important prerequisites making actual implementation of recognised improvement methods relatively likely. Yet before we can look more closely at this aspect, we ought to try to find a definition for regional, or a region, that provides a simple, easily comprehensible basis that is nonetheless sufficiently broad-ranging to enable the various types of region to be roughly categorised.

2. Fundamental Considerations in Defining Regions

In the first instance, experts are agreed that regions can be defined as interconnected areas of medium dimensions characterised by specific features.[1] However, this would encompass the Espace Mittelland just as it would the various individual economic areas of the EU, the ASEAN and also the NAFTA regions. Therefore, most experts see a definition of region as exceeding the municipal level, yet within state boundaries. In reference to the federal relationships manifest in Germany as a the federal republic, Richter further modifies the definition of region by establishing it between the district level the level of the federal states themselves.[2] He thereby constructs a definition of region primarily on a territorial basis, that determines the conceptions and actions of politicians, regional planners and also the office for statistics in particular, yet which differs fundamentally from the definition of

an industrial region outlined above, and which is also only partly in agreement with such regions' territorial aspects.

Actually, a representative of industry would initially associate the term region with a specific customer base located in physical proximity, whereas a regional planner would immediately visualise the area they are responsible for, delineated by administrative limits – and a private person not influenced by such matters would envisage a cognitive map. Hardly anyone would seriously challenge that all three are actually correct – or argue against the fact that all three offer potential for providing solutions to regional problems. Nonetheless, how are we to grasp the fact that in spite of their obvious incompatibilities, all three are still correct?

In reality, these incompatibilities can be resolved providing an eventual collocation of examples of territorial and of systemic concepts of regions.[3] Whilst the former are classified in two to three dimensional planning environments using codified rules and regulations, the latter describe regions according to a system of nodes and branches.

In reality, each region can be represented in this manner, whereby the pattern of interaction illustrated by the nodes and branches is imposed over the outline of the territory. It is not necessary hereby that both designs perfectly overlap one another.

Industrial regions can therefore be classified as areas that, although demarcated in a territorial sense, are those whose characteristics are nonetheless primarily determined through the relationships of exchange between agents of material, energy, money and information. Their primary characteristics are thus systemic in nature. A representation of an economic region derived from this model would therefore also be systemic in nature – in the sense that the economic structure of interrelationships, which, although embodying a level of transfer rates far above average, would nonetheless not permeate completely throughout the actual territory.[4] However, experts resident in the state of North Rhine-Westphalia, that has completely divided up its territory into individual economic regions, are probably of a different opinion. Tab 1 below describes the differentiation between concepts of regions determined in territorial and systemic terms comparing territorial versus systemic economic regions. This is designed to facilitate a better classification of concepts of regions specific to the principle examples.

Table: Contrasting Descriptions of Territorial versus Systemic Interpretations of Economic Regions (Source: Sterr 2000, p.135)[5]

	Territorial Economic Region	Systemic Economic Region
General Characteristics	Area of codified rules and regulations or planning	Economically acting business networks, determined by correspondingly high intensities of communication and interconnection
Spatial Dimensions	An actual, or at least function-orientated visualisation of a phenomenon based on area	Spatially-defined network of nodes (e.g., industrial plant sites) and branches (relationships, connections, communications). Spaces in-between are left blank.
Procedures for Setting	Projection statistically collected data in administrative territorial units	The use of methods to identify spatial relationships (such as, e.g., cluster analyses or gravitation models)
Boundaries	Fixed in administrative terms; highly stable and definable in a spatial sense	At best limited by generating curves of an envelope that not only encompass the system of nodes and branches, but also the empty in-between spaces lying external to the system
Factors Determining Distance	Strictly spatial – in real terms	Organisational and psychological proximity play important roles
Graphical Forms of Representation	Political maps	Graphs, network plans

Generalizations

To generate a comprehensive image of what actually transpires in a region, a variety of agents' concepts of regions may be analysed to compile the following list of key dimensions:

- An illustration of the region in the sense of physical geography including its fundamental physiogeographic elements – whereby the inclusion of more specific details should be orientated to the relevant query to be addressed. In representing the Rhine-Neckar industrial region the basic features should include at least those relief elements as the Odenwald and the Rhineland Forest mountains, the Upper Rhine valley on the one side and Rhine and Neckar as waterways, whilst in other cases, for example, the location of mineral resources or differences in the substratum may be determining areas of anthropogenic transformation.

  An administrative description of the meso area being studied. Essentially, this dimension is used to depict actual boundaries of local authorities, districts and regional planning areas, each of which may represent not only planning and administrative regions, but also areas subject to special legislation / regulations.

  They represent the entire area of a policy region in which the site of an industrial firm and its economic activity are embedded. As the following example of the Rhine-Neckar region illustrates, the trans-state nature of the Rhine-Neckar policy planning region is by no means congruent with the outlines of regional policy areas specific to federal states – in spite of the relatively high level of interconnections.

- Description of regional interlinking relationships:

This is primarily concerned with the interlinking relationships between the locations of various regional participants, and thus the interrelations between extremely multi-layered and fairly complex interlinked sub-systems, such as central living and working areas. Hereby, vertical, horizontal and diagonal connections illustrate the level of exchange of materials, energy, finances and information between system elements. In this sense, the Rhine-Neckar region can therefore also be classified as an industrial region.

- Description of individual perceptions of regions:

This dimension describes people's mental images of regions formed through individual experience and unconscious perceptions. Therefore, it represents an outline of a mental image drawn from personal surroundings, perceptions of an area constantly experienced, that also engenders an emotional proximity. It therefore supplies an important driving force to the development of a local-regional environment and often also a form of regional identity.

3. The Recycling-Oriented Specification of the Regional Unit

Regionalisation of economic activity not only describes the processes involved in a reduction of scale, but also those of a spatial expansion of relationships, quasi 'from the bottom up'. For example, an extension of material exchange relationships between companies is to some extent necessary; in such cases, regional output-input partners beyond one's own town or local authority boundary must be involved in order to arrive at truly sustainable solutions. If, when searching for further options to reduce environmental consumption dictated by production and reproduction, it is thus a question of minimising entropy or of a spatial-systemic distance between undesired outputs and desired inputs, then one must look in both directions here. On the one hand, high-quality recycling solutions may already be economically viable within a smaller spatial framework; on the other hand, high-quality recycling is possibly also dependent upon certain minimum quantities per unit of time, and can thus only be achieved on the basis of inter-business coordination within a regional unit. Moreover, the likelihood of finding somebody who is interested in an unwelcome output, and who can then further utilise it as an input, increases markedly if the perspective from which one searches shifts from the

level of the company and/or industrial area to the region. This underlines the special significance of an industrial agglomeration as a unit of area in which to search when recycling industrial waste. Moreover, as is proven by the following empirically obtained results from the model project 'Establishment of Sustainability-oriented Material Flow Management in the Rhine-Neckar Industrial Region', which was supported by the Federal Ministry for Education and Research, a densely populated industrial area of the size of the Rhine-Neckar region is indeed in a position to provide intra-regional recycling solutions for virtually all waste materials (and this is something that is only very intermittently and haphazardly the case at the level of the industrial area)[6].

Spatial Dimensioning of Material Cycles for Waste Products from Industrial Production in the Rhine-Neckar Industrial Region

	The Spatial Dimension of Recycling					
Process	In-company	Within industrial locations	Within the local authority area	Within the region	Between adjacent regions	Between more distant regions
Composting		Random	Typical	In quite a few cases		
Recycling of building waste		Random	Typical	In quite a few cases		
Processing of old pallets		Random	Typical	Typical		
Regranulation/ remelting of plastics	Among plastic processors, occ. within plants or companies	Random	Frequent	Typical (esp. polyethylene)	In quite a few cases (e.g. polypropylene)	
Processing of waste oil	In quite a few large companies (emulsion-splitting plants)	Random	In quite a few cases	Typical	In quite a few cases	
Electronic waste recycling			In quite a few cases	Typical	In quite a few cases	
Paper recycling			Random	Typical	Typical	
Metal slurry processing				Depends on sector	Depends on sector	In quite a few cases
Metal recycling[7]	E.g. in foundries	Random	Typical (shredding)	Frequent (shredding)		Typical (metal-producing industry)

In actual fact, the recycling pattern visualised above reveals only one essential area where the introduction of intra-regional recycling processes is currently not possible, and in all likelihood will not be possible in future either: this is the area of metal waste, for which there is no smelting capacity in Baden-Württemberg as a result of reasons connected with the history of the industry. Thus in future there will be a continued need for it to be recycled in the blast furnaces of the Ruhr area or (for example, in the case of certain precious metals) in Hamburg too. The Table explains how an industrial region of the magnitude of the Rhine-Neckar area, with 1.8 million inhabitants and a gross product of 44.000 € (40% of which is earned in the secondary sector[8]), possesses sufficiently large problem-solving capacities to also manifest itself as a region offering comprehensive recycling.

However, it is also a fact that these regional output-input options are only utilised by a fraction of those companies we surveyed, so that in many cases one still has to speak, for the time being at least, of a potential recycling area. As such, it may already possess the critical mass and the infrastructure in terms of technical installations to provide corresponding recycling solutions in an economically viable manner. Nevertheless, the critical mass and the infrastructure in terms of technical installations are not yet sufficient to use possible regional potentials for a recycling of unwelcome outputs. Given the experiences of the above-mentioned model project, a crucial reason for this shortcoming is the (reducible) intransparency of regional recycling options; after all, the people who accept

(industrial) residues are often small entrepreneurs who are little known across the spectrum of business sectors). However, one further reason is a lack of inter-company trust that is very difficult to establish, particularly when dealing with problem materials. A functioning recycling region thus also has a systemic nature in the sense that the control costs of waste management transfers, particularly between manufacturing companies, are sufficiently low, and inter-company trust must therefore be sufficiently high for the potential that has been identified to actually be achieved in a manner that promotes sustainability. The formation of cross-company material flow management networks can facilitate this process. However, it should be combined with further problem-solving skills at regional level, permitting a more comprehensive specialist dialogue that, for example, should also include the handling and successful processing of legal hurdles; for example, in order to achieve this, the responsible licensing authorities must also be part of the discussions.

The regional problem-solving skills aimed at developing a sustainability-oriented approach to industrial waste flows that are gathered in such networks should therefore at the very least incorporate the following key elements of the system:

- State institutions
- Private economic subjects (various producers, service providers, and waste removal businesses)
- Society-based interest groups
- Scientific establishments.

4. Moving from the Potential to the Actual Recycling Region

This combination of different players is very demanding. One is therefore left with the question of whether all these players, not just from industry, but also from the worlds of science and politics, are able to sit down together at a table to not only exchange views, but to subsequently implement (sustainability-promoting) recycling potential within the region. Did we not express the suspicion at the outset that the primacy of private business interests might increasingly banish the advocates of ecological, social, or other apparently non-economic factors to assume but a minor supporting role? And is it not true that those very regions that are especially successful from an economic point of view are already (and to an increasing extent) positioned as "nodes in a global network"?[9] Moreover, is it not the case that this increasingly leads to the involvement of external forces which pay no heed to either regional identity or an assumption of regional responsibility? One of the classic responses to these questions is still that economic success is to a considerable extent 'home based': success depends upon the presence of an innovative or creative milieu in the production environment, and the particular satisfaction of high-ranking decision-makers with their extra-professional living environment also represents a crucial location factor. Since this living environment is generally found within spatial proximity of the workplace, the decision-maker is confronted both directly (for example, via direct perception) as well as indirectly (for example, via personified public pressure) with the consequences of their ecologically and/or socially sub-optimal decision. They are thus far more likely to be willing to follow a route to a solution that is more socially and ecologically acceptable than would be the case with an area that lay further away and of which they had a considerably more neutral emotional experience. There is certainly a great deal of truth in this, and it definitely ought to be possible to prove such a connection, particularly in hi-tech regions with their highly qualified yet simultaneously ecologically sensitive and socially demanding workforce. However, at the same time a supposition of this sort also provokes the thesis that one might also then attempt in a contrary manner to offset comparatively expensive solutions to problems emanating from the successful central regions with a different modus operandi in less resilient peripheral regions, so that at the very least it would be possible to ascertain a 'sustainability trade-off'.

Indeed, a business enterprise dictated by a variety of interests cannot guarantee, even for the economic area of regional material cycles, that a sustainability-related, regionally oriented win-win route is pursued. This definitely only ensues as a result of the voluntary aspect, in accordance with which certain ways of behaving or obligations are entered into. However, the fact that awareness of health and the environment, safety at work, and participative approaches are already relatively well developed in broad swathes of the workforce, and that the ground has also been duly prepared at the level of local politics in this area not only reinforces the relevance of corresponding demands when it comes to making decisions, but also favours their implementation. This also (or especially) applies to an open industrial region with creative and proactive players, i.e. one that does not have a regionalist/protectionist focus, but that accepts the challenges posed by the world market in a positive and outgoing manner. Moreover, it can also be explained by the very fact that in a contextual milieu of this sort, a large degree of personal involvement is coupled with a relatively high level of regional problem-solving expertise and problem-solving capability.

This thesis special commitment of business representatives in the context of the formation of networks that occurred within the model project makes plausible that this thesis works.[10]

Endnotes

1 See also in Sinz (1996): Region. In: Treuner. P.: Handwörterbuch der Raumplanung, ARL, Hannover; S. 805-808.

2 Richter (1997): Regionalisierung und interkommunale Zusammenarbeit – Wirtschaftsregionen als Instrumente kommunaler Wirtschaftsförderung. Wiesbaden 1997.

3 See also Ritter's categorisation (1998), who differentiates in his book: "Allgemeine Wirtschaftsgeographie. Eine systemtheoretisch orientierte Einführung" (Munich/Vienna) between territorial, communicative and geographical areas.

4 In this context, Ritter (loc cit., p.17) equates an economic region with treetops appearing as solid bodies to distant observers – which would also behave as such in the wind. Simultaneously, he implies that from a bird's perspective their structure would seem extremely porous, composed, in reality, of 99% empty space.

5 Source: Sterr (2000): Konzeptionelle Grundlagen für den Umgang mit dem Regionsbegriff vor dem Hintergrund eines regionalen Stoffstrommanagements. In: Liesegang/Sterr/Ott: Aufbau und Gestaltung regionaler Stoffstrommanagementnetzwerke, p. 1-25.

6 See also the comments in Sterr (2000): Inter-industrial Material Flow Management – the Rhine-Neckar Experience. In: University of Jyväskylä (Ed.): Proceedings of the Helsinki Symposium on Industrial Ecology and Material Flow, August 30th – September 3rd , pp. 285-293, (and/or www.jyu.fi/helsie/pdf/sterr.pdf). Jyväskyla, Finland.

7 Since not only the Rhine-Neckar region but also Baden-Württemberg possess practically no metal-producing industry, the metal cycle is generally completed using plants in Nordrhein-Westfalen (esp. iron and steel); however, in the case of non-ferrous metals, the cycle is also completed via other Federal States (for information on the role of Norddeutsche Affinerie as a sink for cupriferous secondary material, see Brahmer-Lohss/Gottschick/von Gleich et al.:Nachhaltige Metallwirtschaft, 2000], p. 69 ff.)

8 Data from 1996; Source: Statistische Landesämter/www.rnd.de

9 Amin/Thrift (1992): Neo-Marshallian Nodes in Global Networks. In: International Journal of Urban and Regional Research. Vol. 16, pp. 571-587.

10 Sources: Klee & Kirchmann (1998): Stärkung regionaler Wirtschaftspotenziale – Bestandsaufnahme und Analyse innovativer Kooperationsprojekte. IAW Research Reports, Series B, No. 13, Tübingen; Hahne (1985): Regionalentwicklung durch Aktivierung intraregionaler Potenziale: zu den Chancen 'endogener' Entwicklungsstrategien. Munich; Krätke (1995): Globalisierung und Regionalisierung. In: GZ, pp. 207-221; Bade (1998): Möglichkeiten und Grenzen der Regionalisierung der regionalen Strukturpolitik. In: RuR, Issue 1, 1998; pp. 3-8; Danielzyk & Oßen-brügge: Regionalisierte Entwicklungsstrategien – 'modisches' Phänomen oder neuer Politikansatz. Series: MAG, Vol. 30, Bonn; Fritsch/Koschatzky/Schätzl/Sternberg (1998): Regionale Innovationspotenziale und innovative Netzwerke. In: RuR, Issue, 1998, pp. 243-252; Arndt (1999): Sind intraregional vernetzte Unternehmen erfolgreicher? Eine empirische Analyse zur Embeddedness-These auf der Basis von Industriebetrieben in zehn europäischen Regionen. University of Cologne, Working Paper No. 99-05, Cologne; Dörsam/Icks (1997): Vom Einzelunternehmen zum regionalen Netzwerk: Eine Option für Mittelständische Unternehmen. Series: Schriftenreihe zur Mittelstandsforschung, No. 75 NF, Stuttgart, together with my own project experiences and thoughts.

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The Region as an Action Unit of Tomorrow

1. The Region as an Area of Collective Experience

Some people may be aware of the assertion: "A region is where one finds common action". A functional or action-oriented understanding of the classification and division of geographical area underlies this statement. At the forefront here is a kind of regionalisation along the lines of 'what people can experience together', as was discussed with increasing frequency (chiefly in the 1980's and 1990's) with regard to social, cultural, ecological, or economic aspects (Aydalot, 1988; Giddens, 1988; Porter, 1991; Storper, 1995). This way of understanding areas or regions had not always been the case; chiefly stemming from the early days of topography, it is well known that natural manifestations such as physical features or vegetation were more likely to determine regionalisation. Quite a few people may have vivid memories of the vast number of vegetation, climate, or desert regions one had to swot up on for exams.

The approach to regions that is oriented along the lines of human action, as mentioned at the outset, has undergone a huge change over the course of time. In Switzerland, for example, it is apparent that in the late Middle Ages it was mainly the influence of the nobility or the stewards installed by them that determined the limits of territorial areas of experience. At that time, commonality was defined by aspects such as the right to levy taxes, jurisdiction, or uniform currency, and it usually corresponded to a radius of one or several day's ride – depending on the power exercised by the corresponding authorities. Following the French Revolution, these authorities were gradually replaced by state organs, whereas both the territorial borders (nowadays the cantons) as well as common value systems and autonomies to a large extent survived.

2. The Region as an Economic Area

However, in the 19th and 20th centuries it was above all the Industrial Revolution and the development of new means of transport that radically altered the regional area of action. The day's ride by horse was replaced by the railway, and later by automobiles and goods vehicles. This development in the last 100 years has enormously extended the radius of what one can experience individually, and has caused the space that lines the transit axes to implode. In addition, the vast increase in the significance of the economy in people's everyday lives has meant that nowadays economic aspects have moved centre-stage as a key element of human action that also creates commonality. Today's territorial borders, which stem from the distant past, still take but little account of these new economic action areas. In many cases, territorial autonomies hinder planning in the functional areas that are effective today, since the latter extend far beyond the cantonal borders.

Differing rates of taxation, building regulations, transport concepts, or planning guidelines often cause insuperable obstacles when structuring regions as people experience them today. The dilemma brought about by this lack of congruence between territorial and functional areas to some extent produces unwelcome side-effects, such as reciprocal competition to woo important entrepreneurs and taxpayers in the same economic region, or duplication in the planning of key facilities such as universities, hospitals, or exhibition centres. These unfortunate developments cost the state dear, and will no longer be affordable in the long run. Given the cantons' federal autonomy, the state's attempt on a national level to play a coordinating role in this conflict as a rule achieves only very unsatisfactory results. As a consequence of these problems, one often hears discussions about the removal of cantonal borders so that the areas of cooperation and economic activity as we know them today might be recast

to form functional regions. The following chart shows a current example which works on the basis of barely a dozen economic regions in Switzerland in place of the 26 cantons. In accordance with the long tradition of today's territorial borders, this does of course lead to a vigorous debate, one that is making only very slow progress. Nonetheless, it is interesting in this context that a few months ago the population of two cantons had to vote on a merger, which, as to be expected, was rejected. Another example is the attempt of a handful of cantons to the west of the Mittelland region of Switzerland to establish an element of cooperation, a so-called 'Espace Mittelland', in order to coordinate planning policy, reduce administrative costs, and lobby more effectively in the national parliament for regional interests and the strengthening of the economy (Treina & Rupp, 1994).

3. The Region as a Cooperative Driver of Innovation

In the 1980's and 1990's, regional sciences very much latched onto the concept of region as something that people experience, and shaped the nature of this debate. Special mention should be made of two approaches that emerged in parallel: the 'milieu' approach and the 'cluster' approach. Both approaches are commonly rooted in the notion of the 'industrial district'. As early as late 19th century Britain, Marshall was already giving thought to why certain industrial centres were able to develop at an above-average rate (Marshall, 1947). In so doing, he established that the spatial concentration of compatible economic players (e.g. from the same line of business) can constitute an advantageous -system of cause and effect. He called such a system an 'industrial district", or "a complex and tangled web of external economies and diseconomies (...) of historical and cultural vestiges, which envelops both inter-firm and inter-personal relationships." In addition to the fundamentally necessary factor advantages of such industrial locations (a wealth of raw materials, transport situation, etc.), it is his opinion that an essential non-material advantage consists in the fact that the diffusion of information is accelerated by the specialisation of the local market. These 'information spillovers' lead to accelerated innovation and thus to new and improved solutions for the market: "If one man starts a new idea, it is taken up by others and combined with suggestions of their own, and thus it becomes the source of further new ideas." Marshall is thus the first person to describe the link between the spatial structure of production and the capacity to make business innovations. Decades later, this approach was taken up once again, and in Europe it formed the basis for the development of the milieu approach.

Behind the notion of the milieu, which takes the body of thought derived from sociology and polarisation theory as its starting point, lurks the assumption that the innovation process is accelerated by the exchange of information between related players. This fact shifts the spotlight onto the importance of relationships, quite the opposite of Schumpeter's inventor who develops a new machine in his silent room. A group of authors in Europe has thus recently been chiefly devoting itself to relationship and milieu structures in the innovation process, and is specifically shedding light upon the aspect of relationship networks that encompass a whole range of players. Their work (Maillat, Quévit, & Senn, 1993) is summarised in the concept of the innovative milieu developed by GREMI (Groupe de recherche européen sur les milieux innovateurs), which holds regional milieus and networks responsible for companies' capacity to innovate: "The innovative milieu can be defined as a territorial-based unit in which interactions between economic players develop as a result of the lessons of multilateral transactions that generate side-effects specific to innovation, and because of the convergence of learning which leads to increasingly effective forms of joint resource management." Thus, according to GREMI, the collective learning process that drives the innovation process lies at the heart of economic success. This learning process is facilitated by spatial and social proximity, because this accelerates the exchange of knowledge between the players (so-called filières) in the regional value systems. In contrast to approaches to innovation that are shaped by urban factors, the focus with this

concept is on its regional nature, whether it be in an area made up of a town with its surrounding countryside or an area that is of a polycentric nature, such as the Swiss Jura.

According to GREMI, the advantage of spatial proximity lies in the availability of regional relationship capital involving local players, out of which cooperative relationships to promote the joint generation of innovation are able to develop. In order to avoid the occurrence of the 'lock-in phenomenon' in such milieus (and what is meant by that is 'flogging oneself to death' for the lack of exterior stimuli), Camagni postulates the establishment of networks that also include players outside the region (Camagni, 1991). The difference between the milieu and the network lies in the fact that the milieu represents available, latent relationship potential, and networks are the actual concretisation of targeted cooperative relationships. Furthermore, GREMI stresses the productive interaction that can arise between milieus and networks, because the milieu facilitates the formation of networks, and they in their turn introduce new outside stimuli into the milieu. The presence of a milieu in the locality can therefore be seen as a great competitive advantage, and the trigger of such a process. As a rule, a milieu only includes specific business sectors in which the available local technology and know-how is of international stature. GREMI therefore emphasises the nurturing and development of such milieus, a process in which the state assumes an important role within the framework of regional economic policy.

Likewise drawing upon elements of Marshall's 'industrial district', Lasuén in 1960's Europe developed a cluster theory building upon the polarisation approach. The main assertion of this theory rests upon the interaction between spatial and economic development. Accordingly, Lasuén describes spatial and sectoral clusters that result in mutual stimulation and lead to cumulative growth (Lasuén, 1973). In line with Schumpeter, one encounters successful innovations behind both types of cluster, and their success leads to an accumulation of wealth. An innovative company can, for example, attract other companies as a result of its success, and gradually lead to the formation of a sectoral cluster. In the longer term, economic success then leads to a geographical concentration of widely differing companies and to an economic and demographic massing at the site of the cluster, and this underpins the original sectoral cluster. Since these clusters require a critical mass of innovation, Lasuén takes the view that the necessary basic preconditions are only present in larger towns and cities.

In the neo-liberal Reagan era, this approach was further developed from a business management perspective (Porter, 1991). Porter assumes that traditional commercial theories are outdated in so far as, at the end of the 20th century, national economic borders are becoming ever more permeable, and production factors are visibly becoming more mobile on an international level. On a broad and worldwide empirical basis, Porter surveys modern-day economic development and comes to the conclusion that, from a business perspective, national economies can be seen as specific location units that, depending on the individual set of circumstances, are of interest to (and promise success for) certain companies in the international competition for location. Moreover, the sector-specific success of individual economic nations is based upon a specific set of determining factors dictated by national frameworks, factors that delineate sector-specific value systems. Four determining factors delineate this set: production factors, demand conditions, supplying and related sectors, and business strategies and the competitive conditions that are present. Chance events (such as war or catastrophes) and the state can influence these determining factors. By incorporating all these elements, Porter combines several theoretical approaches in his concept of competition, such as Linder's theory (demand side), external effects as postulated by Böventer (supplier environment), or the classic, factor-oriented location theories. The important thing about this concept is that these determining factors influence and stimulate one another. This gives rise to a system-immanent dynamism that leads to an ongoing further development of the determining factors (so-called 'upgrading') and to cumulative growth. Accor-

ding to Porter, the mutual influencing of the four determining factors, which are described as a diamond, and/or the exchange of production factors between the players occurs via the market.

According to Porter, the spatial way of looking at things is fundamentally oriented towards the national framework, even though he establishes in his empirical research that a great many successful clusters (sectoral groups linked to one another that constitute the economic success of an economic nation) occur in regional concentrations. From this he deduces that spatial proximity can possibly have the effect of increasing competition in a sectoral cluster. This impact can on the one hand be explained by the fact that the spatial concentration of determining factors stimulates interchange within the 'diamond' (and thereby its momentum), and on the other hand that local location advantages enhance the diamond. Influenced by commercial theories, it becomes possible to understand that the strong emphasis on competition is a key element in the optimal functioning of the diamond. In contrast to the previously presented approaches, Porter does not simply restrict himself to the industrial sector, but also includes service sectors in his considerations, thereby lending his concept a substantial breadth of applications (Hill, 1995).

4. The Region as a Critical Mass

The results of empirical research over the last five to ten years have demonstrated how it is possible to observe regional innovation phenomena of this sort, and that it is possible to identify a 'regional geography of innovation networks' that play a role in the important sectoral clusters (Crevoisier, 1993; Schamp, 1995; Geelhaar & Muntwyler, 1997; Treina, 1998). This is for example the case in Switzerland's watch and clock-making and pharmaceutical region, or in Southern Germany's automobile or finance industries. The tracking of major instances of innovation in such sectoral clusters has clearly shown that a complete set of players is able to trigger strong and sustainable innovative stimuli via regular collaboration. Cultural aspects also have an important role to play here: for example, linguistic borders form effective barriers to innovation and diffusion. Added to this is the fact that commercial services have an important trigger function, since if one takes engineering, financial, marketing, or informatics consultancy services as an example, they play a vital role in all innovative projects in terms of input and mediation. Completely in line with Lasuén, urban centres are thus enormously important for innovation networks, since this is where such services are chiefly located. This also makes it clear that a certain critical mass is required for the success of such innovative and self-dynamic regions, since otherwise the necessary concentration of players and infrastructure (transport intersections, universities and colleges, trade and convention centres, etc.) are unable to develop. A potential population of one to two million seems to be a necessary prerequisite, providing a seedbed for the initiation of this process.

The empirical findings additionally show that both cooperative as well as competitive elements are of crucial significance for the sustainable development of regional innovation networks. The innovative strength of the networks dies if cooperation gets out of hand and veers in the direction of exclusion and overly-cosy and inextricable relationships. Any exchange with new and different elements no longer takes place. On the other hand, it is also apparent that competition alone does not produce the critical mass of innovation that is provided by the cooperative pooling of know-how. What is missing in the struggle of mutual competition is mutual fertilisation, and the individual player risks getting lost on their own. One can therefore deduce that the region can provide an ideal source of appropriate and specialised location factors. On the one hand, the spatial and cultural proximity of the players allows one to thoroughly exploit this source and realise its true value in terms of relationships. Yet on the other hand, enough competition must prevail so as to guarantee the necessary restlessness and will to change. Thus to a certain extent the regional innovative network with its array

of factors ends up between the two poles of cooperation and competition in an innovation-oriented self-dynamism that creates long-term regional competitive advantages (Treina, 1998). Although fascinating, the presence of these self-dynamic innovative networks is of course not ubiquitous. Common action is also possible in forms other than industrial districts. We therefore want to discuss different types of region whose common point of reference might be the cooperative overall location.

5. The Settlement Structure as a Typification Element of Regions

The notion that globalisation and regionalisation are two complementary processes has almost become a commonplace. Worldwide economic relations need the region as a basic unit for processes of economic development. The region thus contrasts with the dwindling power of national economies. Moreover, the isolated individual business unit (not even in the form of a global player) does not represent the basic unit of current economic dynamism either. To a far greater extent this falls to regional production and service clusters in which knowledge-based interactions between companies and their environments have an increasingly important role to play (Lux et al., 2001). Thus, with regard to the region, emergent structures are developing as the basis of, so to speak, new regional economies (Barthelt, 2000; Porter, 1998; Nijkamp et al., 1997) as we described this in Chapter 4. In this way, one sees the existence in each case of specific regional orientations of sectors and regional specialisms that render any comparability between regions virtually impossible. The social and economic processes that are specific to each given area produce differing local milieus and regional areas of common action. In this respect, symbolic regulating agents and interactive dimensions within the area overlap here, and the result in each case is that they form their own morphological dimensions. In Regional Studies, these morphological dimensions are usually discussed with the aid of settlement structure models (Brake et al., 2001). This morphological dimension contains only one single dimension of regional structure (in addition to symbolic, regulative, relational and physically material structures, etc.) with which one can vividly refer to the various current regional configurations. Bearing in mind this limitation, we would briefly like to present various models of area/regional structuring.

What is initially established in discussions about regional sciences is an expansion of urban regions based on settlement structures, but not merely in such a way that the core town, the centre, spreads out in a circular fashion (so-called 'peripheral migration'), even though this happens too. Instead, it is the case that the wider area around core towns is subject to general settlement pressure, and urban forms of settlement spill out, so to speak, into the open countryside. This dispersed development of settlements, 'urban sprawl', has its consequences:

- The core town forfeits some of its central functions
- Settlement pressure in densely populated areas that are further away from towns occurs in polycentral structures

Morphologically speaking, and with reference to Germany, it is possible to observe a certain East-West division. Because it remained unclear for a long time who owned what in the East's core towns and cities, a chaotic multitude of distribution agents (and retailers in particular) settled in the area immediately around the towns, adjacent to residential settlements. Such processes have already been operative for many years in the West. This spatial expansion occurs on a more extensive scale, especially in the already-mentioned polycentral form of the creation of islands and fragmentations of urbanised districts; areas one could take as an example would be Rhein-Main and Rhein-Neckar (Kluge, 2000; Bose, 2001).

The polycentral structure is discussed from two perspectives in regional planning and urbanistics under normative urban development structural concepts: firstly under the concept of 'decentral concentration', and secondly under the aspect of the 'network town' or 'networks of towns' (cf. Federal

Office/Environmental Planning Report with further proofs). The 'networks of towns' model, aided in particular by supportive concepts at the federal level, was created in order to set up links and areas of interaction between towns in East and West Germany. The somewhat older concept of decentral concentration attempts to place the emphasis on punctiform central structures as opposed to the dispersed distribution of settlements. The idea is that the centres should also develop their own transport links with one another. All in all, an attempt is being made with such structural guidelines (urban network and decentral concentration) to move away from axial, linear transport and connection axes and the forms of settlement that lie next to them (Bose, loc.cit.). A typical example of this would be Hamburg with its transport axes in the shape of a star (and the bands of settlement that lie next to them) where the roads that are are radially aligned towards the centre).

In terms of regional planning, the concept of decentral concentration was realised in an exemplary fashion in Greater Berlin; in Hanover, an attempt was made in planning terms to combine this concept of decentral concentration with circular open space concepts (parks and areas of green space, fresh air zones, and so forth; cf. Kommunalverband Grossraum Hannover, 1996).

The more strongly the regions are structured in a polycentric manner, the more likely it is that this will lead to network town models. Depending on spatial demands and potentials, network town models can adopt entirely different basic functions as their theme:

- Joint area management for commercial settlements, joint maintenance of expensive infrastructures, but also maintenance of joint functions in growth regions, or to take the strain off core towns (hospitals, maintenance of stocks, etc.)
- Improved East-West networking of towns
- Coordination of similar interests in atrophied regions in which the residential population is moving away, with a considerable impact upon, for example, residential settlements and the infrastructure).
- The mobilisation of endogenous potential in areas far away from densely populated districts.

The urban network model stands out as a result of its variable capacity to adapt to differing regional set-ups and/or expectations of performance; the juxtaposition of a growth region and a balancing and/or atrophied region against the common background of the cooperative overall location make it possible to develop, so to speak, a comprehensive description of areas and regions. The previously discussed approaches of the regional cluster and/or milieu have greater recourse to predetermined structures, and include sectoral areas and/or segregated units of area.

Furthermore, when it comes to these very regions, the urban network model reveals potential that has as yet been insufficiently exhausted and/or realised, potential located in the mesh holes between the strong metropolitan regions. In the opinion of Brake (1999) this is where one recognises the importance of those processes we described above as the creation of a critical mass that is then able to form a certain counterweight to the all-powerful metropolitan areas that are sometimes afflicted with a tendency to colonise. In our view, the performance that is expected of regions far removed from densely populated areas cannot be achieved so easily. For example, is the network that is organised to include medium-sized towns in a position to guarantee an economy that is autonomous, regional, and sustainable in such areas, or does it not at best constitute a supplementary function in the sense of toning down excessive dependency on the metropolitan function? (Stiens, 2001)

Nonetheless, in terms of regionally sustainable economic activity, the urban network approach at the very least takes on a supplementary and stabilising function for those locations that are far away from densely populated areas (between the metropolises). In this sense, the network approach seems ideal for allowing districts that are far away from densely populated areas to realise the expected performance of the cooperative overall location. Small sub-locations should not be merged into a higher location as part of a supplementary and stabilising function, but instead the overall location should

itself actually be made up of the relationships between the sub-locations (integration of specialised sub-locations based on the division of labour).

As has already been indicated, the initial conditions for (and expected performance of) urban networks can thus manifest entirely different emphases and functions, depending on the spatial set-up (requirements):

They can function as a focal point in remote areas, foster catch-up development, mobilise endogenous potential, and break down isolated areas via smaller-scale division of labour in the subareas. All in all, this brings with it a greater specialisation of the areas (Brake, 1999)

Urban networks and decentral concentration are thus ideal models that offer a concept for designing space which is an alternative to the dispersed settlement structure of metropolitan regions (as well as to their shapelessly sprawling increase in scale), with its own setting of focuses and priorities to counteract 'urban sprawl'. Both concepts can help to promote both the spatial and functional specialisation of areas as well as release mobilising effects for home-grown potential.

Alliances such as urban networks are entered into so as to improve one's chances of survival in both European as well as global competition between regions; they lock out inward competition, and lock in cooperation and integration. In the long run, this element of excluding competition can also create ongoing conservative effects. We have therefore put forward the thesis in Chapter 4 that it requires a constant balance of competition and cooperation in order to avoid stagnation.

Nevertheless, the general outcome of our previous discussion remains that these regionalisations/regional innovation systems are based upon several crucial elements: spatial proximity, social interaction, equal status of locations (towns, medium-sized centres, smaller communities), and the promotion of an area-based division of work, frequently with further sector specialisation. The urban network model combined with the three different types of area (the atrophied region, balancing region, and growth region) can be used to establish comprehensive descriptions of areas/regions.

6. Knowledge as a Resource for Regional Sustainability

Regions' capacity to innovate additionally depends upon so-called 'hard' factors relating to area provision, such as infrastructure and businesses that are already located there, but also on 'soft' factors such as the ecological potential of the landscape, cultural milieus, lifestyles, and styles of communication. In addition to these factors, what is striking overall is that in the more recent literature relating to regional economy and regional sciences, a special role is assigned to social interaction ('action settings') as an innovation generator for regions. This significance of human and social capital is linked to the growing role of the knowledge-based economy: namely, the fact that social change is increasingly driven by knowledge – right through to the knowledge-based society whose physical form is freeing itself of a society based on industry and basic services.

Two aspects are probably of crucial importance here:

- The lesser significance of transport costs combined with the decreasing importance of overcoming distances are essential factors when it comes to dispersed settlement structures. This tendency towards dwindling distance-related barriers is increasing to an even greater extent with regard to information and knowledge.

These days, the exchange of information and data is subject to virtually no spatial obstacles. In the shape of the Internet, information has become, so to speak, independent of location, and in practical terms is available at any place one chooses; physical space and temporal barriers seem to be vanishing here.

- It is an entirely different story when it comes to knowledge. Knowledge must be localised via contextualisation and reference to specific problems.

Information has to orientate itself in places where it is transferred into knowledge, because the transformation of information into knowledge is time-consuming and bound by local and/or regional networks with their specific definitions of problems and contexts in which things are applied (Becker, 1999). In turn, they are dependent upon the skills and scientific or knowledge based organisations that can already be found in the locality or region. Here, region and regionalisation very much depend upon human capital, upon the ability to consolidate knowledge, facilitate knowledge-based interactions, and create participative problem-solving networks, and ultimately on the ability to facilitate the potential for direct, personal, face-to-face contacts. Knowledge thus becomes a regional resource, and the idea is to allocate and use it in an optimal manner. The organisations that generate such knowledge are not only the classic or creative scientific establishments, but increasingly they are also 'knowledge organisations' (offering knowledge management or content management) that are organised on a private business footing. Their service consists of providing knowledge that is relevant to problems and possible applications.

If knowledge is localised as a regional resource, linked to a regional infrastructure of knowledge transformation, linked to organisations in the scientific and private as well as in the business management and cultural spheres, linked to available skills and expertise, this thus points to the supremely important role of human, social, and knowledge capital. Nonetheless, region amounts to more than this description; the region's residential environment and its natural and cultural potential are utterly crucial forces that can serve to tie in human capital; it is only a combination of natural, human, and social capital that can create the region's stock of capital, the things that go to make up a region's actual potential.

There is also a good chance that a regionalisation founded upon the knowledge-based economy also has a good chance of being utilised, because despite the deluge of information, knowledge that relates to problems and fits into a concrete context continues to be scarce (what is meant by this is information that is given meaning and assessed for its quality and relevance). "In this respect, knowledge is a commodity that is also in short supply from an economic perspective, particularly when the pressure of problems is mounting," (Becker, 1999). This creation of knowledge that is relevant to everyday practice thus needs to be locally and regionally embedded in regional networks, in the form of loose ties.

In terms of regionalisations, one can draw the following conclusions from these (to some extent) rather theoretically analytical considerations: A region's potential for innovation and success is not only the result of monocausally oriented infrastructures, such as transport links or specialised industries, but requires a combined set of both hard and soft factors; each region needs its own specific development factors and performance demands (Kluge & Schramm, 2001). One must also guarantee the inclusion of natural capital, of the human and social capital of regional players, of mobilised knowledge capital, particularly if one views things from a long-term angle (education/training and skills/qualifications are an important prerequisite for the generation of knowledge). This fact opens an interesting perspective for regions which have a high level in soft factors such as unspoilt nature or attractive towns but a lack in earlier industrial clusters.

Generalizations

7. The Region as Process – Relationship Networks and Processes are more Important than Structures

These aspects pose the question of the management of the regional and political area of action – they provoke the question of whether such creative regions can be manufactured or designed. Before this question is addressed, we would like to go into two further general aspects of regionalisation.

It became clear, not only when considering the knowledge-based society, just how much social interaction and relationships have a role to play. The paradigm or basic model that is currently gaining acceptance from an analytical, normative, and institutional perspective is that of the network, of the network town or urban network. The metaphor of the network appears not to be accidental. Its origin in neurobiology (neuronal networks) and its transfer into regional sciences seems to us to reflect a theoretical core:

Networks become relevant in places where functional relationships and interconnections between the constituent parts are more relevant than the constituent parts themselves. Networks take on their theoretical significance in places where relationships and processes prevail over structures and the components of the system. In this form, the theoretical figure of the network baulks at regions and regional borders that have developed on a purely structural basis, and once again throws up the question of how patterns of this sort, ones which tend to be based upon relationships and processes, can be managed, of how a coherence can be created if area is variously defined by interconnections, administrative and political factors, identity, and perception.

8. The Region as a Project

There is a consensus in the literature on regional economics and regional studies that the basis of a new regional economy and regional innovation systems are beginning to emerge here. The discussion on the management and manageability of regions (processes of regional development) currently alternates between two extremes: the hard and the soft version.

The soft version emphasises the design process, the role of informal procedures, the processual nature of soft forms of organisation and the communicative practices involved in winning people over, and so forth. Weichhart, for example, complains that this way of forming a region leads to a kind of "hiving off or deregulation of parts of the process of political organisation." (Weichhart, 2000). Such an assessment, however, is already verging on the hard position.

The hard position favours a kind of regional administrative body or planning association (Danielzyk 1999; Priebs 1999; Fürst 1999). These are democratically legitimised representative bodies with the corresponding expertise to make decisions about regional planning. Political resistance to this construction is immense. On the one hand, where the regions in question are on the comparative scale of those competing within Europe, they are bound to be larger than classic political and administrative areas (regional council district or regional administration), and smaller than a federal state or canton.

"Within the political systems of the German-speaking area, there is no provision for the regional level as a democratically and politically legitimised reference value or territorial and political subject where it manifests a different calibre to that of existing states/administrative districts/cantons. This is why, as a rule, there are also no political bodies that act as representatives of the region and that could represent their interests." (Weichhart, loc.cit.)

Regionalisations which fail to coincide with classic administrative regions appear to be of such significance that corrresponding state governments feel deprived of power. They are also regarded, as it were, as an attack on the precious notion of district autonomy (as well as an attack on federalism). A clear contradiction arises here between the demands of regulation in the context of a globa-

lised economy and the forces of inertia at state and municipal level. The road towards a politically and democratically secured congruence between space as variously defined by function, perception, and planning, towards a productive 'designer region', seems here to have been systematically blocked. This problem is exacerbated in those areas where not only state borders but also national borders are crossed. The rather more successful German examples of a regional admininstrative body (regional district model) are thus each located within a federal state (Stuttgart, Hanover). This dilemma of incoherent geometry between the problem or action area and the administrative area is already a well-known business phenomenon in its own right. The business world is only too familiar with this problem, namely when complex and interdisciplinary ventures – such as a complex product development – cannot be tackled within the existing linear organisation of a company. In a company or a local authority it is customary to resort to project management and to start a project 'alongside' the linear organisations (administrative areas in our case) which, albeit mature, are unsuitable for this purpose, equipping them with skills, resources and decision power relating to the project. In the end, this course of action stems from the realisation that in a changing and faster-moving world there simply isn't any longer the time or the means to adapt fixed organisational structures to the urgent challenges being posed.

In setting up a 'designer region' and safeguarding design processes with the participation of all the regionally relevant social forces (such as businesses, business representatives, citizens, NGOs, designated officials, etc.) one first needs to offer guarantees and provide the framework so that milieus can stabilise themselves in readiness for social as well as knowledge-based interaction; thus all in all one must ensure openness in the process and the facilitation of problem-related network structures and alliances which in turn are capable of coming up with solutions to the region's problems. Similar to the project idea described above, an important element for problem-solving of this kind might be the process of negotiating a timelimited regional contract aimed at a cooperative overall location in the region and a fair regulation of the burdens and advantages affecting the sub-areas within the overall location. In this way, a multi-centric area could be conceived as an overall area combining social cohesion with the safeguarding of natural and social development potential. The higher (mostly national) level of administration is required to kick-start such 'projects' because it can trigger them by making the necessary funds available. The promotion and development of such 'network regions' beyond the existing administrative borders can then be perceived as a task of national interest and help the region towards a breakthrough as an action unit of tomorrow.

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Outlook

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Regionalisation as a Perspective Offering Sustainable Economic Activity – Overview and Outlook

Within the framework of the German Federal Research Ministry's research initiative 'Model Projects of Sustainable Economy', particular emphasis has been assigned to regional approaches to economic activity. This means a small-scale or regionalised orientation of economic activity. As is demonstrated in what follows, this orientation towards the region has proved worthwhile in the model projects, even though in individual cases it cannot always be the appropriate means of achieving sustainable economy and a sustainable development.

A variety of purposes can be associated with a small-scale or regional orientation of economic activities. They do not necessarily need to aim directly and intentionally at sustainable development, but they can support it. Even in the realms of theory, very differing expectations are associated with a regionalisation or small-scale orientation of economic processes (cf. Kluge & Schramm, 2001). Depending on the prevailing conditions, more locally oriented economic activity can succeed in:

- Better incorporating an easily understood and manageable social context
- Optimising the use of energy and materials
- Managing decentral resources with enhanced synergy
- Creating consistencies of natural material cycles and anthropogenic material flows
- Reducing the amount of transport
- Using and/or reinforcing socio-cultural local ties
- Using easily understood and manageable knowledge
- Using and developing a region's additional endogenous potential

As becomes clear in the contributions to this booklet, these expectations of regionalised economic activity can yield direct and indirect benefits for economic subjects (households, companies, regional bodies) as well as produce stimuli and endorsement for the sustainable development of the region; we also look at this in greater depth in the following presentation. These expectations can be fulfilled to varying degrees, depending on the prevailing initial circumstances. In addition, they can also yield not just benefits, but also stumbling blocks in the process that leads to more sustainability.

Better Incorporating an Easily Understood and Manageable Social Context into Economic Activity

Moreover, economic activity is always a process requiring cooperation; combined action and consultations between the various economic players in relation to this are constantly necessary. For example, they are just as necessary for ensuring quality within a product line and/or value-added chain and for improving products or services as they are for material flow management.

Nowadays, product lines span the entire globe; for a long time now, the various stages in processing and recycling cotton textiles (and likewise personal computers) have no longer taken place in one region. In particular, cross-company consultations and agreements are made with the help of technical norms that are frequently valid throughout the world. Thanks to them, the players no longer need to get to know one another. For example, department store chains are increasingly buying in via the Internet – today, even tenders are invited in this way on a worldwide basis.

Spatial proximity within a value-added chain therefore looks like a long-obsolete requirement. Why should economic players still get to know one another personally in this era of new communication technologies? However, personal knowledge of economic players still facilitates their activity. If one has one's own experience of the surrounding environment, neighbouring competitors can be

assessed just as effortlessly as consumers' favourites and expectations within the catchment area, along with the options for best appealing to them.

In this respect, the economy builds upon social processes in every area. As A. Baier and V. Bennholdt-Thomsen show, it also makes a great deal of sense here to observe forms of economic activity other than those that are market-mediated.[1] Based particularly on the production of foodstuffs and other subsistence products, there is even today a local supply cycle that is only to some extent market-mediated. Social interaction can be maintained and even intensified as a result of those economic activity being related to spatial proximity.

Even economic subjects that are focussed upon market mediation generally build on contacts with other economic players in the neighbourhood and region, players who are not directly aiming at joint economic activity. It is far more the case that these contacts and networks are aimed at the exchange of knowledge (and are, for example, sector-oriented or problem-oriented as a result of some political initiative). They seek the transfer of knowledge and a joint representation of people's interests (professional bodies, neighbourhoods). In only a small number of collaborative set-ups are they oriented towards a common economic activity (such as is the case with joint producer-consumer ventures or regional knowledge transfer centres) that can actually have a regional slant. However, dialogues with suppliers and other agreements within (potential) value-added chains can also be simplified via spatial proximity and the fact that people know one another.

Particularly within innovation processes, agreements can be more easily and simply made if contacts with other players already exist and/or can easily be established. This is proven by experience gained from the model project 'Cooperation to Promote the Eco-friendly Exchange of Resources: Regional Networking of Companies Closing Energy and Material Cycles', as analysed by J. Hafkesbrink and M. Schroll in this volume; in the central Ruhr region they were able to build upon an already existing network, 'Bochum mobil' (Bochum on the move), and thus in this way to arrive within a short time at a successful diffusion of sustainability-oriented innovation within the entire region. In places where relevant and useful contacts and/or networks do not exist, it will be difficult in spite of spatial proximity to implement appropriate innovations. Nevertheless, as became apparent in the model project 'Development and Implementation of a Regional Concept for Energy Management and Its Application to the Karlsruhe Technology Region' , it will be possible under certain circumstances for key agents from neighbouring companies to get to know one another and consider sustainability-oriented innovations in a joint alliance. Knowledge of nearby economic subjects which can be suitably added to can initially be of a primarily social nature, for example, membership of the same golf club. It has been proved that regional networks can substantially improve cross-company innovative regimes (cf. Camagni 1991, together with contributions from T. Kluge & M. Traina als well as Th. Sterr and J. Hafkesbrink & M. Schroll in this volume).

In a similar way, proximity and an easily understood and manageable regional context can also lead to a situation where companies cooperate to promote regional material flow or substance flow management. A regional overview can contribute to sustainable development so long as it actually leads to economic cooperation and even to regional innovative regimes that aim at an increase in the efficient use of resources, material flow management that tends towards consistency, or more adequate patterns of consumption (cf. below).

Outlook

Optimising the Use of Energy and Materials

Regionally-oriented substance and/or material flow management can make a contribution towards optimising the use of energy and materials, not only in the case of individual economic players, but also throughout product lines and product life-cycles. Material flow management of this sort, which as a rule cuts across different sectors, might be initiated at the federal state level or as a political move by regional bodies with an orientation towards 'regional sustainability' (cf. Kluge & Schramm, 2001).

For example, the spatial proximity of industrial concerns can also be used to jointly exploit already existing infrastructures, or maybe even to establish a new joint infrastructure. For example, a chemical company with its own water supply might also provide for nearby commercial enterprises and other industrial concerns that have a need for process water; plant nurseries, swimming pools, and so on could be supplied with waste heat. As emerged from the model project 'Development of a Regional Concept for Energy Management and Its Application to the Karlsruhe Technology Region', which involved participation by globally active companies such as Daimler-Chrysler, Borregard and Stora-Enso which have production sites in an industrial area in Karlsruhe, it is even possible to implement a joint, cross-company infrastructure for the supply of energy in the form of steam (combined heat and power), taking the industrial parks that has developed out of chemical complexes as a role model.[2] However, as the analysis of M. Franke, W. Fichtner, and O. Renn in this volume reveals, the privatisation of the electricity market caused considerable problems in this model project, problems which, particularly as a result of a sharp drop in electricity prices, for a long time proved to be a serious stumbling block when it came to cross-company collaboration between neighbouring companies with high energy use. Since 2002, a federal law has expressly promoted combined heat and power, and this alone has succeeded in having a compensatory effect here.

Optimised use of energy and/or materials can thus lead to reduced consumption of resources, as is for example shown by M. Frank, W. Fichtner and O. Rentz in the case of cross-company and jointly managed energy supply systems. Another example is the Hamburg model project 'Efficiency Increase through Cooperation on Optimising Substance Flows', which is described by A. v. Gleich, M. Gottschick and D. Jepsen. If the end result is that the establishment of the new supply or waste disposal infrastructures does not eat up the surplus that is achievable as a result of the optimisation, then this cooperation thereby leads to increased efficiency in terms of the environment and/or resources. In this respect it contributes to more sustainable development of individual companies, but in some circumstances of the region as a whole too.

Assuming the requisite economic viability for those companies involved, the handling of energy and materials in an optimised manner can be stimulated not only via interested economic players and their joint regional bodies (for example, professional associations), but equally via new institutions[3] and possibly also via the involvement of economic subjects as practice partners in transdisciplinary research projects[4] and feedback of the project's findings and results via series of lectures,[5] professional discussions, and similar forms of public knowledge transfer. Nevertheless, what is required here is the ability to deal skilfully with the tense relationship between the broadly public nature of such forms of knowledge transfer and the broadly exclusive, non-public nature of consultations and agreements that prepare the way for innovation.

Managing Decentral Resources with Enhanced Synergy

Local and regionally accessible resources are to some extent being abandoned at the moment due to effects of scale and other economic reasons. People are increasingly resorting to supra-regional structures, particularly in the area of life support systems (foodstuffs, energy, water). For example, more cheaply produced foods and feedstuffs are brought into the regions from fertile areas of cultivation

and other prime economic locations within the European Community, and there is also an increasing tendency to import them from other continents.

These imports bring about new regional divisions of labour in two directions, both of which are unlikely to be sustainable:

- On the one hand they lead to the fact that it is possible to develop animal breeding and feeding not dependent on foodstuffs grown in that area; even smaller fertile regions and areas of cultivation with their good soils, such as the Warburg Plain that was investigated in the model project 'Approaches to Regional Economic Activity in Rural Society', are thus currently in danger of changing from varied agricultural landscapes to regions with a monostructured agriculture.
- On the other hand, the 'marginal yield areas', particularly in the lower-lying and higher mountain ranges, no longer seem to be sufficiently 'productive'; there is a tendency for EC and also national agricultural policy to direct them away from farming via 'land use reassignment programmes'. As a result, additional land management measures become necessary in order to keep open the former meadows and pastures of these old, traditionally cultivated landscapes and make them attractive to tourists, but also partly to protect bio-diversity. These measures now have to be additionally paid for out of public funds. Moreover, one consequence of the abandoning of agricultural production (but also of food policy management measures and the effects of concentration) is that regional processors in the foodstuffs sector are also giving up; for example, local abattoirs, dairies, and mills are being closed.

When it comes to the supply of water and electricity, there is likewise a growing tendency to primarily use centrally available resources, and at the same time centralised structures are set up (for example, major power plants near sites for the opencast lignite mining). Given current conditions of use and the pressure to rationalise that has been exacerbated by the privatisation debate, central supply structures seem to be viable here, particularly if their entropic effect (for example, insufficient use of waste heat) is ignored in business calculations.

Only if one adopts an exclusively business management-oriented approach is it possible to ignore the fact that the resources that are managed in life support systems can be used not merely in a one-dimensional way, but that they have valuable co-products, at least from a perspective that takes account of region economics and the economic use of resources. These co-products would likewise need to be looked at in terms of sustainable economic activity, since it is only in this way that synergy effects of an ecological and/or economic nature can be achieved.[6] The preservation of regional respectively more local management of resources allows one to use co-products synergetically instead of trading them one-dimensionally (in so doing, one cannot achieve enhanced synergy because the co-products are externalised instead of being considered). In the as yet incompleted model project 'Development of a Learning Model to Promote the Regional Marketing of Foods', this question is investigated in the low-lying mountains of the Bergisches Land and Hunsrück (plus the Nahe Valley). However, it became apparent here that it will be a major undertaking to motivate consumers to buy regional products on the basis of the co-products resulting from food production (for example, care of the countryside and environmental quality management) that can also represent an added benefit for themselves.

Consistency of Biogeochemical Cycles and Anthropogenic Material Flows

In some circumstances, a regional policy of material flow management in particular can also aim to complete material cycles within the region itself. Natural cycles and socio-technical material flows (for example, nitrogen fertilisers and natural water and sewerage systems, wood processing and woodcarving for fuel) could be better co-ordinated in this way. A regional and/or local consistency of natu-

ral cycles and anthropogenic material flows (that are then seen as socio-technical sub-cycles) reduces ecological damage and also tends to prevent sinks (for example, dangerous waste that will become a burden upon subsequent generations). It can thus contribute to sustainable development.

In theory, consistency of this sort could also be achieved without regional policy guidelines and initiatives or cooperation between the region's political districts. However, the prerequisite is then that the use of energy or materials is simultaneously optimised in the majority of the region's households/companies, or a situation arises whereby one can in some other way obtain a (generally monetary) bonus as a result of this orientation towards consistency. At the same time, this orientation towards consistency must be accompanied by a regional perspective and there must also always an orientation towards identical notions of what constitutes a region and its borders.[7] However, it is extremely improbable that all these prerequisites will be satisfied. This is also presumably the reason why corresponding approaches are not present in the research initiative "Regional Approaches to Sustainable Economy" sponsored by the German federal ministry.

Reduction of the Amount of Transport

Spatial proximity within value-added chains respectively product lines cause shorter distances in transport. Assuming appropriate logistics, it is thus possible to drastically reduce the number of transport miles and optimise levels of transport. In a multitude of ways this can have positive effects on both the social and ecological spheres: one needs less energy for transport (fuel which is still almost always derived from mineral oil); emissions associated with transport are also correspondingly reduced (CO2, further environmental problematic or even toxic substances, noise). The decrease in traffic also leads to a reduction in further unwelcome knock-on effects. On the one hand there is a decrease in the risk of accidents or death with their extreme social cost; yet on the other hand noise pollution also decreases, and less traffic and the use of lighter vehicles means that less time and money has to be spent on road maintenance.

Moreover, the focussing on regional economic players might also contribute to avoiding the dreaded traffic gridlock on the roads; the building of new roads (with its devouring of land and bisection of ecosystems) can be prevented, and at a regional level it might even be possible in some circumstances to once again increase the transport of goods by rail or ship. Similar to the transport of goods, a more localised orientation in terms of economic activity might in some circumstances also allow a reduction in commuter and supplies traffic,[8] which can also promote a sustainable change in the hierarchy of gender relationships (cf. Spitzner/Zauke 1997).

However, short distances do not always mean less time and money spent on transport and fewer emissions. It became very clear within the framework of the government-supported initiative that proper logistics are actually crucial here. For example, two small bakeries that bake for the TAGWERK cooperative (which operates on an exclusively regional basis) came out worse than a large centrally located bakery in the Munich region that was compared to them. This was due to the costly and time-consuming way they handled transport, and was highlighted in the 'environmental stock-take' established by the model project 'Producer/Consumer Cooperatives in the Area of Nutrition'. However, one has to ask whether and in what way, for example, work satisfaction can be part of the assessment here.[9]

The Use of Local and Regional Knowledge

One of a region's most important potentials is its residents' skills including specific knowledge about the region . Spatial proximity not only leads to an understanding of the local and regional social structures, but frequently also to the ability in using the resident's local and regional (very often non-scientific) knowledge. Knowledge of the concrete (social and ecological) interrelations and processes in a given area is not usually systematically gathered by scientific means (and sometimes not or only difficult to gather by scientists), but is almost exclusively present as individual (and to some extent collective) empirical knowledge of the residents. The experiences that underlie this knowledge could normally be had locally and on a small scale in social and/or economic processes. This knowledge is thereby based upon the empirical understanding and the spatial bounding to those areas where experiences are had (and generalised).

This local and regional knowledge can be used for the optimisation of economic processes; since this knowledge tends not to have been 'scientificised', the availability in economic terms of such knowledge can mean a unique spatial advantage over competitors (from 'outside').

Easily understood and manageable knowledge can promote sustainable economic activity on a variety of levels.[10] On the one hand it is thereby possible to take adequate account of the region's special ecological features so that sustainable use and development of a region's natural and social potential can be reinforced. On the other hand, the region's social potential is specifically used and developed. However, a prerequisite would be that the spatial limitations of this knowledge gain should be taken into account.

The Use and Consolidation of Socio-Cultural Local Ties

Region can constitute not only a functional area, but also an area that creates "identity" (cf. Kluge & Schramm, 2001, together with the remarks made by Kluge & Traina in this volume). In opposition to former times it is increasingly hard for residents to identify with their local community, particularly if place of residence is not synonymous with place of origin, labour is done outside the place of residence, and informal local work is neglected (however, compare this with the contribution of Baier & Bennholdt-Thomsen in this volume). There is thus a trend towards the emergence of ties that transcend a region in the place of ties that bind one to a small community, though they are in no way spatially homogenous, but instead are very strongly influenced in their respective configurations by individual and socio-cultural experiences and classifications.

In order to promote the development of regional sustainability, the establishment of these sorts of ties in the specific region is the socio-cultural foundation which allows one to perceive and develop a joint responsibility for this area. A socio-cultural "identification" with an area that transcends a given locality is therefore "important because the stimuli that lead to sustainable development must rise above the traditional egocentricity of small communities, and problems cannot simply be solved by shifting them into another area," (Bätzing, 2000).

Certain regions which as a rule have grown historically as a territory, or the landscapes that shape them, make it possible to reinforce identification with them using marketing and PR measures on the one hand, and political processes on the other (for example, within the framework of local and regional agenda processes). In places where regional identification of this sort is present or easily developed, the people who can be reached via these regional ties will also want to buy more products from this region.[11] In regions where regional identification of this sort is present, and to some extent at least there is economic prosperity (as for example in Germany, in the part of the Rhone mountains that lies within Hessen), it is considerably easier to link into these processes than it is in regions where this type of prosperity is absent as a result of structural unemployment, and where a varied regio-

nal history also makes it hard to develop universally acceptable initiatives that promote regional identification;[12] this is demonstrated by the success of the 'Rhöner Charme ('Charm of the Rhone') initiative.[13] Even in metropolitan regions like Berlin that was (to some extent) characterised for more than 40 years by its isolation, it is only possible with great difficulty to develop a regional identity that embraces the surrounding area of Brandenburg as well as the metropolis (cf. Schäfer, 2001).

The Use and Development of a Region's Endogenous Potential

Sustainable development of the regional economy should also be founded upon a careful use and development of both the region's natural as well as its social potential (cf. Kluge & Schramm, 2001). Obligations to one's neighbours, as described for example by Baier and Bennholdt-Thomsen, can make a contribution towards preserving small and medium-sized businesses in the regions (even in the manufacturing sector), and in this way the socio-economic structural breakdowns and disadvantaging of 'structurally weak' regions that is increasing as a result of progressive tertiarisation can at least be cushioned. Through new forms of economic activity and a wider grasp of what constitutes 'caring' economic activity (cf. Jochimsen/Knobloch 1997), together with a restructuring of economic policy and the labour market, it is possible to safeguard jobs and supply structures in the region and thus prevent migration from the regional pool of knowledge. Proposals were developed to this end, particularly in the model project 'The Future of Work and Sustainable Regional Development', though up until now they have not been adequately followed up and implemented as a result of stumbling blocks within the region.

Conscious use and development of the region's endogenous po'tential is primarily founded upon corresponding plans, guidelines, and initiatives on the part of regional policy or upon cooperation between local authorities in the region. If the endogenous potential inherent within a region is used and developed further, this leads to a strengthening of the region: it can thus, for example, assert itself as a location in a globalised business, even one with economic interconnections that are external to the region. The region's economic subjects (households, firms and companies, regional bodies) tend to be able to profit from this in turn. On the other hand, however, it is possible in some circumstances for the economic subjects to achieve direct gains from a regional orientation of their economic activity; the German research initiative "Regional Approaches to Sustainable Development" was concentrated on the realization of such direct win-win situations.[14]

The Interplay of these Expectations

The above-mentioned aspects were in each case discussed individually for systematic reasons, even though they usually do not have an isolated effect, but instead it is frequently only when combined that they lead to the desired economic outcome and/or more sustainability. Although in principle it is also possible to conceive of inhibiting combinations here, there were no negative synergy effects of this kind identified in the reported findings of the model projects.

Objections to Regional Economic Activity – Refuted

There are frequent critical objections that a regionalisation of economic activity is merely a niche solution that only benefits a very small number of economic players. Given the fact that up to now only 15 model projects were carried out as part of the German research initiative, it is impossible to empirically refute this objection here, even if it becomes clear that the very wide range of players derive benefits from a local and/or regional way of going about things. The arguments collected here

and in the contribution from Kluge & Traina basically point in the opposite direction: for a large number of players, a regional orientation has its rewards.

Contrary to the objectors' beliefs, economic activity is frequently still or (already) re-occurring in the regional context anyway; thus crafts and the retail trade (with the exception of super-market and other commercial chains) are locally oriented. However, with reference to these predominant forms of regional economic activity, one has to ask whether and when this regional orientation can already be classed as being on the road to sustainable development, and when this road is abandoned. This is why further planned projects will seek to determine 'crash-barriers' of sustainable economic activity. The idea here is also to clarify the extent to which the 'expectations' presented above should become a component of such 'crash-barriers'.

There are also critical objections to an orientation towards regionalised forms of economic activity along the lines that the debate over regionally sustainable economic activity tends to refer to peripheral areas. However, to counter this one should not only emphasise that rural regions in no way need to compensate deficites (in comparision to metropolitan regions), and that therefore they should make use of forms of economic activity that have been regionalised (cf. Kluge & Schramm 2001). Even in urban industrialized regions, forms of economic activity that relate to this region can lead to sustainability-oriented innovations (as shown in the central Ruhr and in the Rhein-Neckar area). And in conurbanisations regionalised forms of economy can trigger innovative boosts for crafts that can lead not only to a preservation of skilled crafts, but simultaneously to a (sustainable) extension of the life of the products that are manufactured (for example, joinery in the Hamburg metropolitan region, cf. the contribution of Ch. Ax in this booklet).

Up until now, only model projects that built upon win-win situations, where regional approaches to sustainable economic activity promised benefits for all the economic players involved, have been supported within the German research initiative focussed in this booklet. However, it can basically be presumed that a regionalisation of economic activity brings different benefits or no benefits to the various players within and without the region. Therefore in the next steps it has to be investigated, if it will be also possible to arrive at regionally oriented sustainable economic activity beyond win-win situations.

The findings and thoughts collected in this booklet make it clear that a regional economy can always derive real benefits from regionalised sustainable economic activity.[15] However, if one goes beyond win-win situations, business players and (cf. the opposite findings of Baier and Bennholdt-Thomsen) possibly households too in a fair number or regions will not derive any immediate benefits from more localised economic activity. Nonetheless, they will profit indirectly, and frequently only in the medium-term, from improvements in the regional economy. In these cases it will depend on 'soft factors' (for example, socio-cultural local ties) as to whether these players also back regionalised economic activity.

However, it should be emphasised that a regionalisation of economic activity is no panacea. It is unfortunately impossible at this juncture (with the exception of preliminary studies[16]) to satisfy the intention that was initially pursued, namely even at this early stage to provide a systematic answer to the question of the players, product groups, and services for which more localised and/or regionalised economic activity represents the perspective that should be chosen on the road to more sustainability.[17] This is essentially to do with the fact that the model projects were not distributed systematically enough across relevant product groups, and in only three model projects were services also investigated. Moreover, as emerged during the course of the almost one-year-long synthesis process, the model projects had also not been chosen in a way that would represent the different regional types that might facilitate sustainable economic activity for the various economic subjects in accordance to the specific physical and socio-cultural features of these regions.[18]

Outlook

In this booklet, we have ensured there is enough material to provide a systematic response to the question of the extent of regional economic activity. It is to be assumed that (probably from 2003 onwards) the planned second phase of the German federal research ministry's research initiative "Regional Approaches to Sustainable Development" will be able to provide the desired systematic answers to this question.

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Endnotes

1 This perspective has particularly been pursued by the model projects 'The Future of Work and Sustainable Regional Development' and "Approaches to Regional Economic Activity in Rural Communities'.

2 It would presumably also be possible to correspondingly develop cross-company processing and distribution centres for foodstuffs. An approach of this sort was pursued in the model project 'Sustainable Economic Approaches to Supply and Disposal for Communal Kitchens – Products From and For the Region'.

3 For example, in the model project 'Establishing a Sustainability-Oriented System of Sustainability-Oriented Material Flow Management in the Rhine-Neckar Industrial Region' a separate organisation (AGUM e.V.) was founded for this purpose (cf. the contribution of T. Sterr in this volume).

4 This initially exclusive knowledge transfer was, for example, pursued in the model projects 'The Maximum Use of Renewable Raw Materials to Promote Regional Material Cycles – Assessment of Obstacles and Opportunities in the Construction Industry' and 'Cooperation to Promote the Eco-friendly Exchange of Resources: Regional Networking of Companies Closing Energy and Material Cycles'.

5 In the winter term of 2000/2001, an event that was organised at the Technical College in Hamburg within the framework of the model project 'Sustainable Metal Industry' played a corresponding role in terms of promoting the informal networking of various players from the worlds of business and politics.

6 The positive impact of decentralised supply concepts is therefore stressed partly by experts of regional planning, as well as those of resource management and (to some extent) of industrial ecology, too. This applies on the one hand to handling resources in a sustainable manner (for example, extensive protection of ground water) and the balance of nature, while on the other hand there is also a presumption that costs are curbed in addition to the positive effects on regional politics. Renewable raw materials (such as hemp) that can be used as sound or heat-proofing material when building houses can allow one to carry on using decentral resources and continue farming in marginal yield areas. This was one of the State of Baden-Württemberg's reasons for taking part in the model project 'The Maximum Use of Renewable Resources to Promote Regional Material Cycles – Assessment of Obstacles and Opportunities in the Construction Industry'.

7 If one is to be in a position to address the question of where (and to what extent) it is possible to achieve regionalisation (i.e. which economic activities can be sensibly pursued in a coordinated way in which spatial relationships in order to thereby contribute to sustainable effects), the term 'region' must itself be defined. Up until now, a mul-

tiplicity of concepts of 'region' have been used in the scientific and political debate, and they can be of practical use in a variety of ways (cf. in this volume the contributions of Kluge & Traina on the one hand, and of Sterr on the other).

8 This dimension was taken account of in several projects within the government-supported initiative: 'Inform – Offer – Legislate. Ways of Promoting Sustainable Patterns of Consumption Between Consensus and Conflict'; 'Producer/Consumer-Cooperatives in the Area of Nutrition'; 'Methods of Increasing the Amount of Ecologically Produced Foodstuffs in Berlin-Brandenburg'; and 'Sustainable Economic Approaches for Supply and Disposal Systems in Community Kitchens – Products From and for the Region'.

9 The problem of the integration of social and ecological data also came up in other model projects – particularly in the project 'Sustainable Urban Districts in Areas of Inner-City Renewal: Material Flow Analysis as an Evaluative Approach'.

10 This knowledge-based approach was unfortunately not followed in most of the model projects, so that it is impossible to make any statements as to whether regional knowledge that can be mobilised to promote sustainable processes actually still exists to any great extent.

11 This thesis features in the following model projects: 'Development of an Educational Model forthe Regional Marketing of Foodstuffs'; 'Sustainable Urban Districts in Areas of Inner-City Renewal: Material Flow Analysis as an Evaluative Approach'; 'Producer/Consumer Cooperatives in the Area of Nutrition'; and 'Ways of Distributing Ecologically Produced Foods in Berlin-Brandenburg'.

12 Corresponding stumbling blocks have been observed in the Dessau-Wittenberg region in the model project 'The Future of Work and Sustainable Regional Development' .

13 For more than 5 years now there has been a range of foods available in numerous inns and restaurants in the Rhone area under the label 'Rhöner Charme'; these foods are produced regionally, and not infrequently byorganic peasants.

14 Yet it might also be interesting for future model projects to simultaneously investigate the indirect consequences of strengthening a region via regionalisation and sustainable orientation of economic activity.

15 Nonetheless, the regional economy is frequently not a formal economic subject at all, so that these benefits make absolutely no significant difference in monetary terms.

16 Cf. the contribution of Lux & Schramm in this volume.

17 Not least of all, this is also down to the special make-up of the model projects that were supported in this initiative by the German Federal Ministry of Research. This is due to the fact that, of necessity, the findings of the model projects were initially drawn up with reference to individual cases, because their main focus was upon concrete collaborations with specific economic players.

18 The different economic, social, and cultural potentials in the different types of region that were surveyed could therefore not be teased out either.

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