



TRANSITION STRATEGIES FOR METROPOLITAN FOOD CLUSTERS

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Metropolitan food clusters entail the development of a new agri logistic system and promises to produce gains for people, planet, and profit. Establishing a transition towards system innovations like metropolitan food clusters needs strategies to overcome the challenges actors face, because transitions are complex processes which are difficult to manage. To define major challenges and strategies to cope with them a literature study into transition, complexity, and learning theories was conducted. The findings were used in analyzing the case study *Greenpark*, which is located in an emerging economy. In this article it is concluded that system innovations like metropolitan food clusters need the establishment of niches in which they can foster in an environment based on trust and learning and in which a management style is used which manages order and disorder, aims for innovation, and provides room for self organization. When scaling up to the regime level the challenge arises how to push through existing practices and rules and in this context, the support of an influential actor network is essential. This means connections are necessary between the innovation process inside a niche and people and organizations outside the niche with executive power and involving potential executors of metropolitan food clusters in the design process is a suited way of doing this. The challenge however is to understand and prevent the innovative potential of the niche from weakening because of a management style that is based on hierarchy and control.

Keywords: Agri business, System innovation, Emerging economies, Process management.

1. INTRODUCTION

Malthus (1798) proclaimed that high population growth in his time would lead to a large scale famine outbreak, because food production would not be able to catch up. A global famine outbreak has not happened, because food production increased dramatically. Innovations were introduced, like plant breeding, irrigation and agrochemicals (Someren and Nijhof, 2010). A huge increase in human welfare has also been witnesses in many places of the world. Nevertheless, hunger still is a major issue: *“Since 1990, developing regions have made some progress towards the Millennium Development Goals target of halving the proportion of people suffering from hunger. The share of undernourished populations decreased from 20 per cent in*

1990-1992 to 16 per cent in 2005-2007, the latest period with available data.” (UN, 2010: 11) According to the UN (2010) progress has stalled since 2000.

Smeets (2011) showed that much food is produced on the most productive soils in delta areas and coastal areas. However, these areas are also the places where most people live and where, with regard to the developing world, population growth and urbanization are to be expected. Examples are metropolises like Bangkok (Thailand), Mumbai (India), and Shanghai (China). A massive increase in the quantity and quality of food production is crucial to meet the demand of the growing middle class in many emerging economies (Smeets, 2011). The number of people living in poverty is, the economic crisis or climate change withstanding, even expected to fall further: “*the overall poverty rate is still expected to fall to 15 per cent by 2015, which translates to around 920 million people living under the international poverty line—half the number in 1990.*” (UN, 2010: 4) The growth of the population and the decrease of extreme poverty constitute a huge challenge, to transform the agri business sector.

Closely related to the world food challenge is the quest for sustainable food production. Environmental sustainability is for instance one of the Millennium Goals of the United Nations (2010). The existing agribusiness sector in many countries is related to various unsustainable practices like contamination of ground water with toxic pesticides, high concentrations of phosphorus in soils and greenhouse gases (Someren and Nijhof, 2010). Smeets (2011) proposes a strategy based on industrialization and intensification of agro food production as a promising strategy for the improvement of productivity and sustainability in terms of People, Planet, and Profit. Part of this strategy is the clustering of various activities in agri food chains in one location or in one business park. This concept is called an *agropark*. In Europe it appears counter intuitive for many people that intensification and industrialization could lead to a more sustainable agri business sector. Also some scientists (for instance Ploeg, 2009) lean towards an approach based on extensification, diversification of activities (e.g. nature management or tourism) and to regionally organized food systems. Therefore it is important to make clear what is meant by the agropark concept. “*An agropark is a cluster of agro functions and the related economic activities on or around a location. Agroparks combine highly productive plant and animal production and processing in industrial mode with the input of high levels of knowledge and technology. The cycles of water, minerals and gases are skillfully closed within the cluster of different chains, and the use of fossil energy is minimized, particularly by the processing of various flows of waste products and by-products in the chains. Non-agricultural functions such as energy production and waste and water management can also be integrated in the industrial process. An agropark may therefore be seen as the application of industrial ecology in the agro sector. Agroparks are the outcome of a design process in which a new balance is sought between agriculture as it functions in global networks and the local environment of those same farms. It amounts to a system innovation, i.e. not just the innovation of agricultural production itself but also of other relationships among the stakeholders concerned. In this regard the concept of sustainable development occupies centre-stage as a set of objectives that are simultaneously concerned with a reduction in environmental pollution, greater economic return and a better working and living environment for the people concerned.*” (Smeets, 2011: 39-40) The concept is developed in The Netherlands where agroparks and related agri food clusters have been realized like Agriport A7¹, Biopark Terneuzen,² or ZON Fresh Park Venlo³. Components of the agropark concept can be found in many agri food businesses in The Netherlands.

1 See www.agriporta7.nl

2 See www.bioparkterneuzen.com

Agroparks are part of a proposition for a new agribusiness system which would produce and process the food of the middle class of the world and especially in emerging economies. This would be done in a way which is beneficial to farmers and consumers, is profitable, and is better for the environment than existing food production processes. This new overall system is called an Intelligent Agrologistic Network (Smeets, 2011), Metropolitan Agriculture⁴, or *Metropolitan Food Clusters*⁵. The last name will be used in this article. A system innovation is needed to realize a functioning agropark and its linkages with the other components of this new system. A system innovation involves a fundamental change in both the structure of the system and the relation among the participants (Loorbach and Rotmans, 2006). Existing structures, rules, and habits work against the implementation of innovative practice, which are called *novelties*. “*Radical novelties often have a mismatch with the existing regime and do not easily break through.*” (Geels, 2005: 684). Therefore, system innovations are complex and very difficult to realize. In this article we assume, based on Smeets (2011), that developing metropolitan food clusters is one strategy for realizing sustainable agri food production. Because of the innovative character of the concepts and the little experience with developing an agropark in emerging economies, it is important to explore where obstacles can be located and what would be the strategies to tackle them. More insight is needed in how to support novelties in their development and especially with regard to agroparks.

Therefore, two central questions were studied:

1. What are the challenges actors face when working on the establishment of metropolitan food clusters?
2. Which strategies can be distinguished to stimulate the transition to the system innovation metropolitan food clusters?

2. RESEARCH METHOD

In our research two research methods were used: a literature study and a case study to explore the characteristics of strategies to stimulate a transition into a new agri business system in which agroparks play an important role. The literature review focused on transition theory, complexity theory and learning theory. Transition theory was selected because it gives a framework to how innovations become new systems and to the obstacles one encounters when introducing new innovations. The evolutionary theory of transition theory is mostly used in technologic innovation studies. Agroparks as a concept involve technological innovations, but are also

³ See www.freshparkvenlo.nl

⁴ “This perspective is a bouquet of various ways of production that strengthen each other. Together, they constitute a strong base for production of sufficient variety of products, under conditions and forms that vary sufficiently to adapt to changing societal norms. The common factor in all these manifestations is their metropolitan character; they are all agricultural activities that fit in the metropolitan setting. A setting that is characterized by a high population density and a high pressure on space. This leads to very specific market opportunities, ranging from highly effective production to combinations of care and wellness that can only develop in such circumstances” (www.transforum.nl).

⁵ Smeets (2011) mentions Metropolitan Food Clusters as a synonym for Metropolitan Agriculture. The usage of a new name is meant to make a distinction from metropolitan agriculture, because of the associations with extensive agriculture in cities, which is totally different from the concept of agroparks which would produce for the urban or metropolitan population.

economic clusters⁶ (see Porter, 2000). Evolutionary economy (Boschma, Frenken, and Lambooy, 2002) made clear that it is feasible to study the development of clusters from an evolutionary approach too (Schot, 1998). Complexity theory was selected because system innovations by definition have to cope with high levels of complexity. Therefore, complexity theory provides insight into the challenges actors face in realizing agroparks and provides strategies to cope with complexity. Because, both transition theory and complexity theory stress the importance of learning, learning theory is also involved in the literature study.

An agropark development in an emerging economy was selected as the case study. This agropark is called *Greenpark*⁷. The authors were involved in the process monitoring of the development of an agropark and its satellites which would transform the rural areas and agri food production practices in the region in which the agropark would be located. The process monitoring focused on the social process and less on the impact of the development. Process monitoring is a form of process evaluation with an *Ex Durante* approach. This means that monitoring and evaluation activities focus on what happens during the process; not before or after. The process monitoring monitored, facilitated, and captured the learning experiences of the Agropark development which was studied in our research. The learning process of participants stood at the core of the process monitoring. The process monitors included learning workshops which are part of what is called *reflexive monitoring* in action (Mierlo et al., 2010). In addition to that also non participatory evaluations and expert roles were used, because this was explicitly requested by the process managers and because this was more feasible in a multi-cultural setting. In this role interviews were taken (40), meetings and workshops were observed and e-mails and reports were studied. These parts of the process monitoring belong to *interactive monitoring* (Mierlo et al., 2010). Also impact monitoring on deliverables, planning, and etcetera was done. The process monitors did not only study the process, but also introduced theoretical perspectives to the individuals working on the planning of this agropark and used them for the learning objectives of participants. The process monitoring therefore had elements of *action research* (Brydon-Miller et al., 2003).

3. LITERATURE STUDY

3.1 Transition process

A transition can be portrayed as a long-term process of change in which a society or a subsystem of society fundamentally changes (Rotmans et al., 2000, Rotmans et al., 2001). The result of a successful transition is the implementation of a system innovation. System innovations fundamentally change both the structure of the system and the relation among the participants (Loorbach and Rotmans, 2006). System innovations change shared patterns of thinking and acting and alter networks (Rotmans, 2005). Strategic niche management is a strategy to realize transitions. In this school of thought, transitions start with novelties (Geels, 2005). These novelties are practices which do not fit in with the existing main stream practices. Existing systems and the forces which influence actors, such as entrepreneurs, produce novelties.

⁶ In a cluster many companies from one economic sector are located in proximity of one another in one area and this has a positive effect on other sectors and areas. Examples are Silicon Valley in the USA around IT, the Ruhr area in Germany around steel and coal industry, and Bangalore in India around IT.

⁷ Not the real name

Agroparks can be perceived of as such a novelty. Novelties are other ways of doing things (agriculture, logistics, and etcetera.) than normal. Because the performance of radical novelties is initially low, they need to grow in protected spaces which shield them from mainstream market selection. Niches thus act as ‘incubation rooms’ for radical novelties (Schot, 1998) in which the voicing and shaping of expectations, network formation and learning can take place (Raven, 2005). Niches are not the same as laboratories; the novelty is exposed to selection by its environment, but is protected to too rigid and rapid selection (Raven, 2005). Niches are important, because they provide locations for learning processes and provide space to build the social networks which support innovations (Geels, 2005).

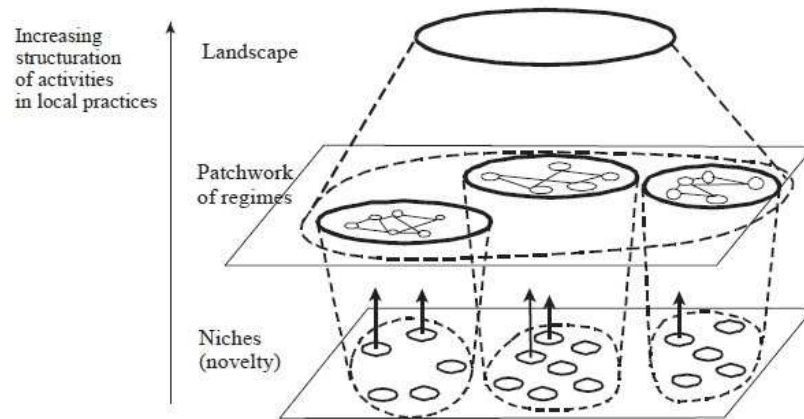


Figure 1. Scales in transformation processes (Geels, 2002: 1261).

The macro-level is formed by the sociotechnical landscape, which refers to aspects of the wider exogenous environment, which affect sociotechnical development (Geels, 2005). “*Landscapes are beyond the direct influence of actors and cannot be changed at will.*” (Geels, 2005: 684). The landscape level can influence novelties though. Smeets (2011) for instance speaks about trends as urbanization and population growth and about the need for new ways of agri food production and logistics. *Regimes* are embedded within landscapes and niches within regimes. A regime for instance is the current agri business system in an emerging economy, or more precisely the way produced food is processed and transported. System innovation is about transforming niches into regimes and about replacing of existing regimes or even co-existence with them. These transition processes are summarized in figure 2. Multiple innovative initiatives (or niches) are “out there” on a given moment and only some of them will have a bright future. A process of development and selection decides this. Progress will be slow at the start, but if successful, a rapid acceleration can happen after the take off, when the novelties are accepted and hold promise for a ‘bright future’.

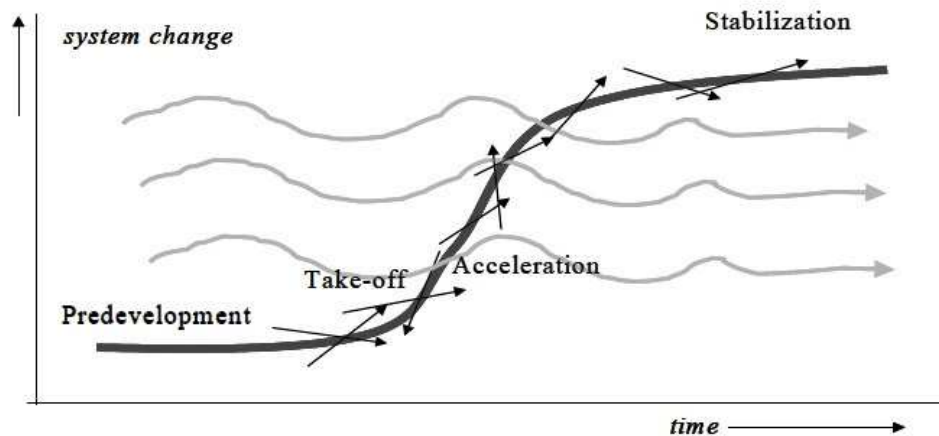


Figure 2. Transition processes (Rotmans et al., 2000).

Transitions are complex because of the multilevel dynamics (Kemp et al, 1998). From governance literature it is known that political authority is shared across multiple levels of government (Marks, 1993) and also with other actors (Falkner, 1997). All these levels and actors provide obstacles and stimuli for transitions. The transition from niche to regime is very difficult to accomplish because many existing rules, values and habits work against it. A system innovation has to ‘conquer’ its space, to adapt rules and to make the innovation societally acceptable. To transform from a niche to a system innovation means that the actors are willing to invest in maintaining or expanding the niche, even when short-term market value is absent (Raven, 2005). Entrepreneurs have to believe and invest in it. Experts have to develop and improve the system innovation and education and research programs that will be related to the proposition. Societal organizations and politicians can give their support and ‘sell’ it to their networks. Governments can alter rules and make new ones. Process facilitators or platforms (Schot, 2001) facilitate and modulate interactions between the various actors involved. In the seeking of support and involvement of actors it is important to constitute the network with care. Influential actors can support the niche because of their resources, but can also slow its development down, because of vested interests and also due to a lack of innovative potential (Raven, 2005). Therefore Raven (2005) concludes that it is also important to involve actors who do not have strong ties with the dominant regime.

It is the expansion of the network of supporters and their actions that make it possible to establish a new regime, which means that the system innovation is implemented in a segment of society. When an agropark will have at least a number of business enterprises located on it, and when these companies are cooperating with one another on the basis of industrial ecology principles, then it becomes a regime change.

3.2 Complexity

The implementation of a system innovation means coping with high levels of complexity. Jiggins (1994: 47) gave confirmation of this assumption: *“Innovative processes are always complex; complexity refers to causally related phenomena that are products of cross-relations among hierarchic levels. Everything depends on everything else, but processes affecting each other occur on different time and space scales. While the rules governing the underlying order can be*

established, the outcomes cannot be determined or predicted.” Complexity theories are concerned with the emergence of order in dynamic non-linear systems which are constantly changing in a largely unpredictable manner (Burnes, 2005). These systems can be natural systems and human systems, including human actions, organizations and networks, and can include both. According to complexity theory, the key to cope with complexity is to act on the ‘*edge of chaos*’. A system needs to be not too stable (or static) because then it would not be able to adjust and thus to survive. When a system is too chaotic it will be overwhelmed by change and it will not be able to survive either (Burnes, 2005). However being on the edge of chaos, means that there is a chance to fall over the edge.

Complex adaptive system theory (Goodwin, 1994) differs from other complexity theories in that it seeks to understand the behavior of the individual elements or agents in the system (Stacey, 2003). The local interaction of each sub-system or individual agent is valued and also local activities are taken into account. In this perspective, the behavior of individuals and inter human relationship are very important. The human relations give shape to interaction and to what is produced by this relation (this could be a product, a land use plan, new knowledge, etcetera). Much dynamics and variety in such a network stimulate innovation. The dynamic capability of a system is partly determined by the way the network is facilitated. One of the main issues is trust between the participants. Without it participants will often not accept uncertainty, chaos, vulnerability, and instability, which belong to complex systems (Stacey, 1995).

Systems⁸ in complexity theory all have two characteristics in common. Firstly, they are *self-organizing* and secondly, they have a set of *order generating rules* (Burnes, 2005). Order generating rules are needed not to fall over the edge of chaos, mentioned before. Order generating rules are not so much rules in the bureaucratic sense, but foremost self established rules, or norms and values. Too many rules prohibit change and innovation to occur, when there are not enough rules on the other hand change and innovation spin out of control (Macintosh and Maclean, 2001). Lack of order generating rules causes a feeling of chaos to be overwhelming, at least for certain individuals. This leads to high levels of stress and uncertainty (Dörner, 1997). System innovations and complexity need a management style which is based on self organization. As also stated by Burnes (2005) the activities should not be affected much by control and hierarchical structures and managers, but by managers who require the skill to manage order and disorder (Morgan, 1997). Experimentation, divergent views, innovative thinking, operating in new patterns, cultural clashes, conflict and even rule breaking should be allowed and perhaps even be encouraged (Burnes, 2005 after Bechtold, 1997 and Stacey, 1995) The key to achieving this kind of structure a network of people and organizations needs to be organized in flexible basis units, these are called *flexible structures* or *semi structures* (Brown and Eisenhardt, 1997) To have efficient functioning of these structures open and quick information exchange is of the utmost importance (Burnes, 2005 after Davis 2000). For innovation to happen collaboratively by actors such a structure is needed. The Scientific Council for Government Policy of the Netherlands (WRR, 2008) calls such a structure a *third space*.⁹

3.3 Learning

In transition processes, learning is a very important element; especially when a system innovation is involved (Raven, 2005). Innovation is about doing new things and this means that

⁸ Such as people and organizations working on the implementation of the agropark concept

⁹ They focus on cooperation between the private sector and knowledge institutions

learning takes place. Because, developing an agropark is a multi-actor activity with a high level of complexity, learning takes place in interaction between individuals and organizations. Two kinds of organizational learning can be distinguished: *single loop learning* and *double loop learning* which are based on how organizations respond to error (Argyris and Schön, 1978: 2-3): “When the error detected and corrected permits the organization to carry on its present policies or achieve its presents objectives, then that error-and-correction process is single-loop learning. Single-loop learning is like a thermostat that learns when it is too hot or too cold and turns the heat on or off. The thermostat can perform this task because it can receive information (the temperature of the room) and take corrective action. Double-loop learning occurs when error is detected and corrected in ways that involve the modification of an organization’s underlying norms, policies, and objectives.” System innovation can only happen when double loop learning takes place.

Learning does often not happen by itself; especially not double loop learning. Humans filter and manipulate information they receive because of the *value system* (Argyris and Schön, 1978) or *belief system* (Sabatier, 1988) they adhere to and are therefore often are not open to the arguments and knowledge provided by others. Termeer et al. (2010) have shown this for instance convincingly for their case mega stables in the Netherlands. The more the knowledge that was produced, the more actors appeared to become entrenched in their positions. Therefore, the challenge is to discover how learning can be facilitated and how conflicts between actors can be prevented or used positively. Wenger (1998; 2000) discovered that in successful organizations, learning happens because of social interaction in communities concerning a practice, which is supported by Kolb and Kolb (2005) for education and by Regeer (2010) for innovation processes. In communication between individuals *new knowledge* emerges (Regeer, 2010). This makes learning by communication in a community¹⁰ potentially an effective learning strategy. In a community of practice, participants learn together about problems and solutions, which they can use in their own practices. Wenger (2000) puts much emphasis on the importance of belonging and identity. Learning according to him is not a neutral activity but part of the identity of individuals and their sense of where they belong, which is part of their social relations. This involves developing a shared repertoire of communal resources: language, routines, sensibilities, artifacts, tools, stories, and etcetera.

When taking on a complex challenge like developing an agropark, it is not enough to form a community of practice. The challenge is to be innovative. It is important to have much variety for innovation (Termeer, 2007). Different backgrounds, knowledge, and values are needed to produce innovation. Also important is that different kinds of knowledge are present and used. The concept of *transdisciplinarity* in knowledge production is particularly interesting in this regard. It “... is a new form of learning and problem-solving involving co-operation between different parts of society and science in order to meet complex challenges of society. Transdisciplinary research starts from tangible, real-world problems. Solutions are devised in collaboration with multiple stakeholders” (Thompson Klein et al., 2001: 7). Transdisciplinarity is not just about having different scientific disciplines on board, but also on having different kinds of knowledge owners on board. Smeets (2011) and Jonge (2009) stress the need to involve all different societal domains (Knowledge institutions, Entrepreneurs, Non governmental organizations and Governments, or KENGi actors) in creative design processes for innovation, or co-design.

¹⁰ The arrangements to use new knowledge for public policy formulation is called knowledge governance by Buuren and Eshuis (2010) and Gerritsen et al., (2010).

3.4 Conclusions literature study

In a transition towards a system innovation a novelty (the metropolitan food cluster concept) many challenges arise, which concern high levels of complexity, existing rules, incentives, habits, and etcetera. Therefore transition theory says that novelties are best fostered in a niche and first gradually and later more rapidly becoming a regime (a functioning Greenpark for example), that will change the socio technical landscape. In this process the novelty becomes more concrete and is improved by knowledge production and learning. Gradually more actors become involved and rules and habits change. What was strange before becomes more normal, feasible, and attractive to be part of. In the end, it becomes a full fledged system innovation (metropolitan food clusters) and therefore changes the conditions for other systems.

Based on our literature study the following characteristics of strategies for agropark development are summarized, which will be used in the analysis of the case study:

1. Novelties are best developed in a niche, an environment partly protected from regime and landscape forces and where transdisciplinary learning and experimentation are core activities;
2. Balancing on the edge of chaos is the most suited management style for the development of the novelty. Self organization must be embraced and trust, divergent and innovative views, and new working patterns are crucial elements.
3. To enter the regime level it is needed to form and expand a coalition of actors, to improve the knowledge about the innovations to acquire resources, and to alter existing rules and regulations

4. CASE STUDY

4.1 Developing Greenpark

The case *Greenpark* is a venture to develop an agropark in an emerging economy as a first step in the transformation of the complete agri business sector in this country. A major industrial player in that country does have the vision to broaden their primary scope of business activity with added value activities related to agribusiness. Via the strategic partner network, the agropark option was pointed out to them. After a visit to the Netherlands they were convinced of the concept and they wanted to invest in its development. Their ambition was to develop a business park which would be focused on multiple agri food chains to be clustered with their production, processing, trade, and logistic activities. The expectation was that this would bring synergetic effects through sustainable practices that would be taken up in the park such as the re-use of water, waste, and minerals and the reduction of transportation and the usage of fossil fuels. This was with a realization that sustainable business can be very profitable and could potentially work as a strong incentive for involved parties. For example, manure of chicken can be composted and then be used to grow mushrooms. This would reduce the cost for the entrepreneurs and be more sustainable planet-wise. This principle is what constitutes industrial ecology. The plan was to establish common infrastructure (for water and power supply and effluent treatment mainly) conforming to international standards along with residential area and an institutional area with education research and development facilities.

While Greenpark was meant to strengthen the anchor investor's position as agricultural forerunner and innovator, it was also positioned as a strategy to improve the lives and the

business of the farmers in the surrounding areas. Social responsibility by investing in the education of children and adults in adjacent villages for instance was also part of the development of Greenpark. Since the enterprises which would be established on Greenpark will need raw material and other inputs from the adjoining rural areas, it was envisioned that multiple rural satellite centers should be developed wherein farmers in the vicinity can bring and trade their produce, which can then be transported to Greenpark. The rural satellite centers can potentially transform the agri production practices and crop patterns in the region while serving as centers delivering multiple services to the farmers, such as extension, warehousing, banking, and etcetera.

A consortium of Dutch specialists¹¹ and local partners supported by a project infrastructure developer took up the task of identifying an anchor investor for the realization of an agropark. Some of the Dutch specialists were already involved in the development of agroparks and related concepts in The Netherlands and other countries but from previous developments, it was learned that having local partners' involvement and getting an anchor investor (to sponsor the Greenpark development and officially assign the masterplan preparation) were important pre-conditions. In the Greenpark development process, participants started with communicating the story of agroparks and the need to introduce agri business practices based on the principles of agroparks and metropolitan food clusters to key stakeholders in the country. In 2008, the anchor investor did give an assignment to the consortium to devise a masterplan for the realization of an agropark. The development of Greenpark started with a planning phase wherein operationalisation of concepts as a viable business proposition under local conditions and in the local cultural context was taken up. The implementation phase also started about the same time, by building the basic general infrastructure such as land preparation and boundary wall construction for the agropark site.

While business-wise the operationalisation of the agropark is has yet to happen, (external investors have to commit themselves to start up activities by engaging with the anchor investor) formal letter's of intent have been acquired and agreements have been reached with a few front runners.

4.2 Greenpark as a niche in the transition process

The Greenpark initiative is one of the first initiatives in the emerging economy in which the agropark concept and its logistical environment would be implemented. The Government's policies also include the ambition to increase food production and to develop agri business clusters, but the implementation of these governmental ambitions has fallen short of expectations. The system innovation did not have to start at zero in the country since some agribusiness companies which qualify for the new agri-system do already exist (the companies already produce and process for the world market), but these companies are still the exception and not the mainstream. While even from the perspective of The Netherlands, agroparks are still found to be innovative, it is much further in the development process than in the country in which Greenpark is located and has proven its added value (see Smeets, 2011). The concepts of agroparks and metropolitan food clusters were found innovative as acknowledged by the anchor investors who visited the Netherlands to get a first hand impression and witness fully operational and functional models there.

¹¹ In Metropolitan Food Clusters and in planning processes with an active role for KENGi actors (Knowledge Institutions, Entrepreneurs, Non governmental organizations and Governments, who together produce innovation.

Participants aim to introduce the concepts by using and adapting what was developed in The Netherlands. Still, many issues had to be explored and solutions have to be invented tailor made to suit the requirements of the local conditions. For instance, high tech solutions were available, but the key question was whether they would work and be profitable in a country with a very different socio-economic situation, climate and agri business environment was. Cultural issues were also involved. Developing Greenpark the available technology notwithstanding would still need a system innovation in the emerging economy in which Greenpark is located.

In the planning phase, the consortium assisted the anchor investor in designing a masterplan for the agropark and its satellites, business planning, supply and demand analysis, developing an education and training strategy and a decision support system. Studies were carried out to discover what would be possible and feasible at the site, and at the rural satellites, what would be needed for park management and under what conditions investors would be attracted to Greenpark. Workshops and interviews were also organized not only to inform entrepreneurs, politicians, civil servants, educational institutions and non governmental organizations, but also to obtain their ideas, knowledge, and expertise and use this in the planning activities for the anchor investor. Entrepreneurs were also involved in the planning phase itself for making a realistic assessment of key estimates such as scale of business operations which had a bearing on the masterplan. Agribusiness entrepreneurs from the Netherlands and other countries were involved in addition to local entrepreneurs. These engagements with experts and potential investors lead to the first serious engagements in which entrepreneurs committed themselves to start pilots together with the anchor investor of Greenpark. These enterprises committed themselves to actual investments if these pilots prove feasible. The expectation (as in the case of most infrastructure development projects) is that after these first investors come in, other investors will follow.

It is questionable whether the Greenpark venture can be perceived of as a true niche. The Greenpark initiative had for example many resources available to its development and implementation: a site was available, political support and part of the needed permits was given, and reputed companies attached themselves to the development. It was not some small scale out of the picture development, but an ambitious and out in the open development that was envisioned. The anchor investor started the development for instance by asking the head of the regional Government to be present at the initiation ceremony of the agropark and communicated to the media, on internet and in the relation network that they would develop Greenpark. The expectation of many actors was that within a short amount of time the agropark would start functioning. From hindsight this was perhaps not so realistic, but these expectations were very real for the people and organizations involved. Much pressure was present to start a rural satellite somewhere in a phase in which it was not clear what businesses would be located on Greenpark let alone what inputs it would need. The anchor investor also expected the assigners to provide them with a detailed plan which could be used to start building when the consortium was working on a strategic zoning plan. These issues and personal mutations eventually lead to the decrease of trust and to a decrease of inter organizational learning in the process.

4.3 Complexity management

The planning of the Greenpark development happened in a dynamic environment. All concerned did agree that to attract a viable cluster of entrepreneurs to the Greenpark is the critical factor for success. So far that did not happen. Not because of a lack of interest by possible entrepreneurs, but more because these entrepreneurs did not have complete clarity of what Greenpark will mean

for their business (costs, added value, needed investment -own versus common-, institutional context, tax, entry fees, exit fees, etc.). Until recently the Greenpark could not give this required clarity for entrepreneurs thereby creating an unwanted deadlock. The recent global economic crisis made entrepreneurs even more reluctant to engage in new venture and key persons left the process.

The project management of the consortium and the anchor investor (assigner) engaged in regular meetings and brainstorming sessions and this sometimes lead to alterations in the assignments and new questions being posed by the assigner. Discussions were also held with potential investors, civil servants, politicians and other experts and many of them lead to changes in the content of the produced plans and planning activities. This sometimes would confuse individuals and organizations and some people had profound difficulties with working in such dynamic circumstances. Some of the people involved were used to work on projects with clear deliverables and time schedules. It was observed that in labor and resource intensive work (such as computer modeling and building infrastructure¹²) it can become very unpleasant and time consuming if parameters change and works have to start anew. At the same time Greenpark was also a development in which time schedules and deliverables where involved and contracts where signed. The organizations involved all had internal rules and regulations which had an influence on the working process. Payments to consortium could only be made when the procedures of the anchor investor where followed. The consortium also had to abide to internal rules of conduct. These rules provided order, but not necessarily the kind of order needed for an innovation process. Much energy had to be invested in tearing down procedural obstacles. No formal niche could be obtained and therefore the consortium had to struggle with innovation in a context of bureaucratic rules which are meant to control. For that a system innovation had been needed by all the organizations involved in the Greenpark development.

The persons involved were aware of the complexity of innovation processes and the need for social learning. Especially within the actor network¹³ meetings where organized in which people involved would solve problems together and in which everyone could address issues. Individuals were, for a large part, responsible to tackle problems themselves and take initiative. A select group decided on the strategic issues though. They left room for other ideas, but only to certain extent so that they remained in control mainly for coordinating the deliverables submission (as per the schedule agreed upon by the assigner). The advisory project was part of the existing bureaucratic system based on control, (this was understandable and normal), but it had resulted in a few people, the project management team to be in control of the working process. This project management team of the advisory consortium had regular and intensive communication with each other, mostly by telephone and e-mail, but they also met one another often in person for discussions. In all this communication, one was constantly engaged in creating order in chaos by discussing what happened and how best to react. These kind of discussions also happened with the anchor investor. The assignments involved helping them grasp what the development of agropark would mean to them and what actions should be taken for successful establishment. Also meetings were organized in which it progress was discussed and follow up steps where defined.

Because of differences in management style, large real and mental distances to travel, and the persons appointed to positions, most learning between advisers and assigners was single

¹² Which is done by the anchor investor and not by the consortium

¹³ Or KENGi network, incorporating Knowledge institutions, Entrepreneurs, Non governmental organizations and Governments, which together produce innovation

loop. The assigner often resorted to asking many technical questions on how to build the structural elements of Greenpark which was out of the scope of the assignment. They were resisting change in their working processes and reluctant to appoint business developers as an addition to the project engineering team they formed. This was problematic because no professional business development strategy was in place at the anchor investor level and opportunities for the acquisition of investors were missed out. Examples of double loop learning existed too. The anchor investor decided they should co-invest in the first businesses which would be established on Greenpark and concerning rural satellites. They also decided that they should take up park management, especially with regard to the industrial ecological activities. This was partly the result of discussions with the advisers. To further strengthen double loop learning, new teams were formed in which the advisers and assigners would work together. Handholding or comforting activities would be conducted in which the consortium would assist the anchor investor in actually developing the agropark. This is yet to be formalized.

Process facilitation techniques were used to enable actors to make explicit what they wanted and needed and experience opportunities for cooperation with other actors. The experiences of the uses of those facilitation techniques in the Greenpark developed are mixed. In some workshops the process facilitators were content with the results and concluded that the approach worked. In one particular investor meeting, several participants were involved in informal meetings and found the planned program less interesting. Many participants were not very open in sharing their ideas and ambitions, but were more interested in selling their own business propositions. Cultural issues were involved in which it was found not polite to disagree and people did not show everything they think. A large number of letters of intent were delivered at the anchor investor and advisers so it did have a positive effect. More successful were the missions in which entrepreneurs were taken to locations and by this, they did discover for themselves what they could do and how feasible that would be. These missions also did lead to some follow up activity.

4.4 From niche to regime

In 4.2 it was concluded that the Greenpark development was not a real niche. It had characteristics of a niche, but it was not a really an ideal place in which the novelty of an agropark could come to blossom. Therefore, it aimed to make an impact on the regime level at the same time as the actual development of the novelty. Nonetheless, progress was made. A strategic zoning plan and strategic plans for rural satellites, business planning and education and extension are ready. On top of that, some enterprises have stated their interest to become involved in the actual development of Greenpark while some had lost interest. Others remain in a waiting mode. Now that the anchor investor decided to consider co-investment and to take on park management and now that the stage is set for the first pilots to start, there is prospective for further investments. The anchor investor, aided by its consortium did succeed in maintaining their hold on the land and to get necessary clearances and approvals from different government departments and authorities, including the one which would allow them to actually develop an industrial scale business park. Some clearances are still to be obtained.

The planning process so far entailed all kinds of communication with actors. The communication was directed at obtaining knowledge and also to ensure support in the implementation of Greenpark. Much energy was directed to communication with private parties, but much communication with governments also did happen, especially, on a regional level (and less on the national level) and with foreign embassies. Some but limited communication

happened with non governmental organizations, farmers at the village level, and local knowledge and education institutions especially with regard to the satellite centers and the development of an extension system. Less communication happened with farmer organizations and local businessmen in the vicinity of Greenpark. Some agitation did arise from villagers and farmers in 2008. This cooled down because of adaptations to the plans and by investing in social projects, but it is possible that resistance will emerge again. Some farmers and farmer leaders complained about the lack of communication with them on the planned development at Greenpark. They were willing to engage in opportunities which Greenpark would offer to them, but not much happened until recently. Some of the local farmer organizations expressed their willingness to commit to investments in Greenpark if given a chance and the municipal agricultural civil servants were interested in facilitating interaction with farmers. The lack of communication so far led to disappointments, but some interviewed stakeholders also expressed their willingness to engage with the Greenpark initiative.

The nature of the agropark concept also means that actors committed to it want rapid innovations, or jump innovations. Although it is an explicit target of Greenpark to make life better for farmers, some potential investors advised to not incorporate local farmers to the initiative fearing interference from their affiliated political parties or because they feared it would diminish the innovative potential of their propositions. They rather would want to set up something totally new independently. Other potential investors expressed their willingness to engage with farmers. For some of them it is even a reason to be interested in the Greenpark venture in the first place. To actually bring the transformation process closer to a system innovation, and to remove the obstacles some of which are still present, much more involvement of the various actors is needed.

The key question is whether Greenpark will transform into a real agropark as part of a metropolitan food cluster. Some hopeful signs were present, such as the development of pilots, but the anchor investor is worried about the lack of further investments. This can be partly caused by their own actions, such as the lack of an in-house professional business development or commercial team present. At the end of 2010, some distrust emerged in the network of involved organizations, which made it unsure how things will proceed. These tensions were partly caused by cultural issues in which a lack of respect was sensed, where none was meant. It is a possibility that the anchor investor would go for the quickest route to “fill up” their land with enterprises. They would probably be able to do so, because many companies are very willing to work with them because of loyalties and because the anchor investor is able to open new doors for them. This route would not necessarily lead to an actual agropark let alone to a new agri business system. No formal guarantees are present that the anchor investor would remain true to the ideas behind the agropark novelty. Some of the key persons in the development have internalized the concepts into their actions, which can be regarded as a hopeful development for how actors will handle the ideas behind the system innovation. For instance, a former consultant to the anchor investor became one of the potential investors and is also involved in the pilots. Also the engineering team committed themselves to the concept, because they communicated it in their network. It all depends on how the development of Greenpark will continue. With the development plan for pilots, new dynamics have emerged which will ultimately decide whether the Greenpark development will lead to the desired system innovation or not.

5. CONCLUSIONS AND DISCUSSION

After analyzing the Greenpark case we give conclusions based on the literature study and the case study. The first research question was:

What are the challenges actors face when working on the establishment of metropolitan food clusters?

In paragraph 4 it was shown that it really is a challenge to come from a concept to a system innovation. New obstacles are always present, pressures for short term results are high, information is lacking, and unexpected events work against the establishment of a metropolitan food cluster or a component of one, like Greenpark. For instance, people involved in the Greenpark development agree that to attract a viable cluster of entrepreneurs is the critical factor for the successful establishment of Greenpark. For this entrepreneurs need to have complete clarity of what a Metropolitan Food Clusters mean for their business (costs, added value, needed investment, institutional context, tax, entry fees, exit fees, and etcetera). Not being able to provide interested entrepreneurs the required clarity was a major reason for the creation of an unwanted deadlock at Greenpark.

When expectations and time pressure are high and everyone looks closely on what is happening, tensions can emerge between parties and people. It proves especially difficult to maintain a position “on the edge of chaos”. Complexity theory learns that self organization, trust, divergent and innovative views, and adapted working processes are needed. This requires trust from both the anchor investor as well as from the consortium involved. It implies that a mutual hands on process is needed. However at Greenpark we saw that the inclination of the anchor investor was to continuously fall back in a control and command mode.

Explanations for the difficulty to establish the usage of the required management style can be found in the fact that many organizations and professionals are used to hierarchical management styles and have to cope with existing habits, rules, and procedures which hinder other management styles. Mainstream ideas about project management in which clear targets and timeframes are given also make it more difficult to act on the edge of chaos. Hopeful developments are present at Greenpark in the form of pilots and formal intentions for future investments, but many obstacles remain to be conquered, such as a lack of the need for new parties to get involved in the development,

The second research question was:

Which strategies can be distinguished to stimulate the transition to the system innovation metropolitan food clusters?

Based on the research reported here the following strategies can be distinguished for organizations and individuals engaged in the development of metropolitan food clusters in emerging economies:

1. The growth from novelty to system innovation can be fostered in a niche. This means that the development of metropolitan food clusters and components like Greenpark should start in the form of a pilot or another innovation friendly organization form like a third space, for which a consortium of entrepreneurs and other actors is committed. In this

niche actors engage in discussions exchanging information and ideas, learn to trust one another, can afford to show their vulnerabilities. Commitment for actual investments emerges during the execution of a pilot. By this approach a gap between plan and action can be prevented. When the development of an agropark like Greenpark (as part of a metropolitan food cluster) actually takes place it has a jump start and a real chance at achieving the required scale of activities.

2. Developing a system innovation like a metropolitan food cluster also includes a revision of the management styles of organizations involved with particular attention to procedures and management styles. Management can assist the system innovation process by allowing financial and planning risks, the exploring of different visions and ideas, relying on self organization of teams, and trusting the persons and organizations involved in self organization
3. To develop the required means for the actual establishment of a metropolitan food cluster the plans can be co-designed with the actors who will be engaged in the actual realization, including entrepreneurs, governments, and non-governmental organizations. This does not mean that everyone has to be involved in the design process, but crucial people do, including the ones who have different agenda's or a perceived lack of understanding. Not only top level officials should engage in co-design activities but also with middle management and the staff who actually realize the decisions of the management. This will take a different form in different cultures, but it important to prevent that in the actual realization of an agropark or other components of a metropolitan food clusters decisions are taken which damage the proposition. Co-design is also a strategy to make sure that the proposition remains realistic and that it will be able for entrepreneurs to actually invest in it.
4. Maintaining and developing good relations and trust between individuals and organizations is extremely important, especially when large cultural differences are present. This is crucial for the phase of niche development as well for the transformation at the regime and landscape levels. In the transition process the network of supporting stakeholders has to expand and involved actors will have adapted roles. It is imperative to maintain trust and implementation power during this process.

The challenge remains to design the arrangements by which niches can be established and eventually evolve into regimes. It is understood that hierarchic leadership does not produce innovation, but hierarchy is everywhere and its support is needed to establish a niche for learning and experimentation. The support of the powerful is at the same necessary as a threat. Concepts like Communities of Practice (Wenger, 1998) and Knowledge Governance (Buuren and Eshuis, 2010; Gerritsen et al., 2010) have emerged and are promising concepts for this dilemma, but have not achieved the level of concreteness needed to guide participants in innovation processes, like the Greenpark. This should be considered as a topic for future research.

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REFERENCES

- Argyris, G.A. and Schön, D. (1978). *Organizational Learning: A theory of action perspective*. Reading MA: Addison-Wesley.
- Boschma, R.A., Frenken, K. and Lambooy, J.G (2002). *Evolutionaire economie; een inleiding*. Bussum: Coutinho
- Brown, S.L. and K.M. Eisenhart (1997). The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations. In: *Administrative Science Quarterly*, Vol, 2 March 1-34
- Brydon-Miller, M., Greenwood, M. and Maguire, P. (2003). *Why action research?* In: *Action Research*. Volume 1 (1): 9-28.
- Burnes, B. (2005). Complexity theories and organizational Change. In: *The International Journal of management Reviews*, vol 7. Issue 2, 73-90
- Buuren, M.W. van, and Eshuis, J. (2010). Knowledge governance: complementing hierarchies, networks and markets? In: In 't Veld, R.J. (Ed.) (2010), *Knowledge democracy - consequences for science, politics and media*. Heidelberg: Springer: 283-297.
- Dörner, D. (1997). *The logic of failure. Recognizing and avoiding error in complex situations*. New York, Metropolitan Books, 1-37
- Falkner, G. (1997). Multi-level plus multi-actor governance in the European Union. Paper delivered at the *Fifth Biennial ECSA International Conference*, Seattle, May 29- June 1 1997.
- Geels, F.W. (2005). Processes and patterns in transitions and system innovations. Refining the co-evolutionary multi-level perspective. In: *Technological Forecasting & Social Change*: 72 (2005): 681 - 696.
- Geels, F.W. (2002). Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case study. In: *Research Policy*: 31 (8/9) (2002): 1257–1274.
- Gerritsen, A.L., Stuiver, M., Termeer, C.J.A.M. and Werkman, R. (2000). *Knowledge Governance for sustainable rural development. Exploring potentials, characteristics and barriers in the Northern Frisian Woodlands*. Paper for the ERSCP-EMSU conference, October 25-29, 2010, Delft, The Netherlands.
- Goodwin, B. (1994). *How the Leopard Changed its Sports*. London: Weifeld & Nicholson
- Jiggins, J. (1994). *Changing the boundaries: Woman centered perspectives on population and the environment*. Island Press, Washington DC.
- Jonge, J. de (2009). *Landscape architecture: between politics and science*. Uitgeverij Blauwdruk.
- Kemp, R., Schot, J. en Hoogma, R.J.F. (1998). Regime shifts to sustainability through processes of niche formation: the approach of strategic nich management. In: *Technology Analysis and Strategic Management*: 10: 175-196.
- Kolb, A.Y and Kolb, D.A. (2005). Learning Styles and Learning Spaces: Enhancing Experiential Learning in Higher Education. In: *Academy of Management Learning & Education*, 4 (2): 193-212.
- Loorbach, D. and Rotmans, J. (2006). Managing transitions for sustainable development. In: Olshoorn, X. and Wieczorek, A.J. (2006). *Understanding industrial transformation: views from different disciplines*. Springer: 187-206.
- Macintosh, R. and D. Maclean (1999). *Conditioned emergence: researching change and changing research*. International Journal of operations and production management. Vol 21 Issue 10 1343-1357
- Malthus T.R. (1798). *An essay on the principle of population*. In Oxford World's Classics reprint.

- Marks, G. (1993). Structural Policy And Multi-Level Governance, In: Carfuny, A. and Rosenthal. G. (eds) *The State Of The European Community*, Vol. 2: *The Maastricht Debates And Beyond*, London: Longman.
- Mierlo, B. van, B.J. Regeer, M. van Amstel, M. Arkesteijn, V. Beekman, J.F.G. Bunders, T. de Cock Buning, B. Elzen, A.Ch. Hoes, C. Leeuwis (2010). *Reflective Monitoring in Action. A Guide for Monitoring System Innovation Projects*. Wageningen University / Free University of Amsterdam: Wageningen / Amsterdam.
- Morgan, G. (1997). *Images of Organizations*. London: Sage.
- Morgan, G. (1998). *Unfolding logics of change*. In *Images of Organizations*, the executive edition. Sage publications, p. 213-259. London
- Nowotny, H., P. Scott, M. Gibbons (2001). *Re-Thinking Science: Knowledge and the Public in an Age of Uncertainty*. Polity Press, Cambridge.
- Peterson, C.H. (2008). *Transformational Supply Chains and the "Wicked Problem" of Sustainability: aligning Knowledge, Innovation, Entrepreneurship and Leadership*, Michigan State University"
- Ploeg, J.D. van der (2009). Transition: contradictory but interacting processes of change in Dutch agriculture. In: Poppe, K.J., C.J.A.M. Termeer & M. Slingerland, 2009. *Transitions towards sustainable agriculture and food chains in peri-urban areas*. Wageningen Academic Publishers, Wageningen. P. 293-307.
- Porter, M. (2000). Location, Competition, and Economic Development: Local Clusters in a Global Economy. In: *Economic Development Quarterly* 14 (1): 15-34.
- Raven, R.P.J.M. (2005). *Strategic Niche Management for Biomass. A comparative study on the experimental introduction of bioenergy technologies in the Netherlands and Denmark*. Eindhoven University Press.
- Rip, A., Kemp, R. (1998). Technological Change. In: Rayner, S. & Malone, L. (Eds.). *Human Choice and Climate Change*. Batelle Press, Columbus, Ohio. pp 327 – 399.
- Rotmans, J. (2005). *Maatschappelijke innovatie; tussen droom en werkelijkheid staat complexiteit*. Rotterdam, Drift.
- Rotmans, J., R. Kemp, M.B.A. van Asselt, F.W. Geels, G. Verbong and K. Molendijk (2000), *Transitions & Transition Management: the case of an emission-poor energy supply*, Maastricht: ICIS (International Centre for Integrative Studies).
- Rotmans, J., R. Kemp and M.B.A. van Asselt (2001), More Evolution than Revolution. *Transition Management in Public Policy*, *Foresight* 3, 15-31
- Sabatier, P.A. (1988). An advocacy coalition framework of policy change and the role of policy oriented learning therein. In: *Policy Sciences*, Vol. 21: 129-168.
- Schot, J.W., (2001), Towards new forms of participatory technology development, in: *Technology Analysis & Strategic Management* (13), No.1: 39-52
- Schot, J.W. (1998). The usefulness of evolutionary models for explaining innovation. The case of the Netherlands in the nineteenth century. In: *History of Technology*: 14 (1998): 173 - 200.
- Smeets, P.J.A.M. (2011). *Expedition agroparks. Research by design into sustainable development and agriculture in the network society*. Wageningen Academic Publishers: Wageningen, the Netherlands.
- Someren, T.C.R. van and Nijhof, A.H.J. (2010). *Triple P Business Development in the Dutch agro-food sector. 9 cases of strategic innovation*. Van Gorcum: Assen.
- Stacey, R.D. (2003). *Strategic Management and Organizational Dynamics: The challenge of complexity*. Harlow FT Prentice Hall.
- Stacey, R.D. (1995). The Science of Complexity and Alternative Perspective for strategic change processes. In: *Strategic Management Journal*, Vol 16, Issue 6, 477-495.
- Termeer, C.J.A.M., Breeman, G., Lieshout, M. van, and Pot, W. (2010). Why more knowledge could thwart democracy: configurations and fixations in the Dutch mega-stables debate. In: In 't Veld, R.J. (Ed.), *Knowledge democracy - consequences for science, politics and media*. Heidelberg: Springer: 99-111.
- Termeer, C.J.A.M. (2007). *Vital differences. On public leadership and societal innovation*. Wageningen.

Thompson Klein, J., Grossenbacher-Mansuy, W., Häberli, R., Bill, A., Scholz, R.W., Welti, M. (Ed.) (2001). *Transdisciplinarity: Joint Problem Solving among Science, Technology, and Society. An effective way for managing complexity*. Basel, Birkhauser.

Wenger, E. (1998). *Communities of Practices, Learning, Meaning and Identity*: Cambridge: Cambridge University Press.

Wenger, E. (2000). Communities of Practice and Social Learning Systems. In: *Organization*, 7 (2): 225-246.

WRR, (2008). *Innovatie vernieuwd. Opening in viervoud*. Amsterdam University Press, Amsterdam.

United Nations (2010). *The Millennium Development Goals Report 2010*. New York.