Foresights, scenarios and sustainable development – a pluriformity perspective

Research Memorandum 2013-17

Eveline van Leeuwen
Peter Nijkamp
Aliye Ahu Akgün
Masood Gheasi

FORESIGHTS, SCENARIOS AND SUSTAINABLE DEVELOPMENT – A PLURIFORMITY PERSPECTIVE

Eveline van Leeuwen Peter Nijkamp Aliye Ahu Akgün* Masood Gheasi

Dept. of Spatial Economics
VU University
Amsterdam, The Netherlands
*Dept. of Urban and Regional Planning
Istanbul Technical University
Istanbul, Turkey

Abstract

This paper is concerned with future sustainable development strategies from a stakeholders' perspective. The paper reviews various sustainable development contributions and addresses also various methodological issues pertaining to sustainable development. The literature review lays the foundation for the operational analysis in this paper. Based on a multidimensional indicator system, reflecting a pluriformity in approaches and viewpoints, a systemic perspective based on a multicriteria model is proposed against the background of an 'amoeba' diagram. By means of this model, a set of local or regional empirical case studies is presented originating from five European countries, namely Italy, Spain, Romania, Finland and Scotland. To map out and analyse sustainable development of the areas under consideration, we develop four scenarios (Competitiveness, Continuity, Capacity, and Coherence) for each of these five European cases, and evaluate these cases on the basis of viewpoints of relevant stakeholders regarding future sustainable development. These scenarios are next systematically assessed with a view to the identification of the most preferred future. Our results indicate that in general the most preferred sustainable future is formed by the Coherence scenario, in which ecological and social factors are the most influential sustainability factors.

Pn421elmg

"If everybody in this world of ours were six feet tall and a foot and half wide and a foot thick (and that is making people a little bigger than they usually are), then the whole of the human race… could be packed into a box measuring half a mile in each direction…

If we transported that box to the Grand Canyon of Arizona and balanced it neatly on the low stone wall that keeps people from breaking their necks when stunned by the incredible beauty of that silent witness of the forces of Eternity, and then called little Noodle the dachshund, and told him… to give this unwieldy contraption a slight push with his soft brown nose, there would be a moment of crunching and ripping as the wooden planks loosened stoned and shrubs and trees on their downward path and then a low and even softer bumpity-bumpity-bump and a sudden splash when the outer edges struck the banks of the Colorado River.

Then silence and oblivion!

The human sardines in their mortuary chest would soon be forgotten. The canyon would go on battling wind and air and sun and rain as is has done since it was created.

The World would continue to run its even course through the uncharted heavens. The astronomers on distant and nearby planets would have noticed nothing out of the ordinary.

A century from now, a little mound, densely covered with vegetable matter, would perhaps indicate where humanity lay buried.

And that would be all."

H.W. van Loon, *Van Loon's Geography, The Story of the World We Live in*, Simon & Schuster, New York, 1932, pp. 3-4

1. Focus on Futures

> *"Worldwide, there is only a market for five computers".*
>
> Thomas J. Watson, President-Director IBM, 1958

'If… then…' is a conditional proposition that describes precisely a logical causal statement on possible future events. Obtaining due insight into an uncertain future has been a permanent source of rational speculation in the history of mankind. In the Hellenistic period, the foundation for systematic foresight analysis was laid already by the Oracle of Delphi which – in contrast to popular wisdom – was not based on incoherent exclamations of an ancient intoxicated goddess, but on evidence-based information collected by her through listening to subordinates of any political figure who wanted to get a useful hint on how to face the future. The medieval and pre-modern literature was also full of seemingly rational attempts to predict uncertain future events, such as catastrophes or wars. The aim to acquire political power was often an inspiration for obtaining strategic future information on unknown territories, as is clearly reflected in the support of leading dynasties in European countries for the great discovery trips from the fifteenth to the eighteenth century.

The control of future circumstances that might adversely affect current or future economic or political developments has over the past decades led to many scientific efforts to uncover the driving forces of potential drastic changes in the nearby or distant future. One of the first well-documented studies on future developments can be found in Kahn and Wiener (1967), who made a scientific analysis of the bandwidth within which the year 2000 could be rationally explored ('a framework for speculation'). Their investigation was inspired by control principles derived inter alia from cybernetics. The application of advanced modelling experiments was in particular advocated by Tinbergen (1956), who was able to construct system-wide models for economic policy and forecasting. Early attempts to offer national forecasts on the success conditions of economic systems were also made by Ayn Rand (1957). In subsequent decades similar attempts were made, inter alia by Alvin Toffler (1970), whose foresight analysis was mainly based on collecting a wealth of (sometimes selective) trend information to map out the contours of likely future mega-trends. The scientific interest in future development has even led to a new orientation in the planning discipline, sometimes coined futurology. In our modern era the exploration of possible futures has led to a great popularity of scenario analysis, for instance,

in the energy, environmental or transportation sector (see e.g. Nijkamp et al. 1998, Giaoutzi et al. 2011).

The debate on a sustainable future has indeed prompted a renewed interest in the contours of – and the conditions for – environmentally-friendly developments that might ensure a durable use of the earth's scarce resources. The concern about social, economic and environmental sustainability dates back to the end of the 1980s, with the publication of the WCED report on '*Our Common Future*' (1987) (often called the Brundtland Report). But its origins can be found already earlier in the post-war period, while very early attempts to address environmental and future issues in the social sciences can be found a few centuries back. A few illustrations will be offered here to indicate the interest of earlier scholars in ecologically-benign developments.

The trade-off between own interests and others' interest can already be traced in one of the great philosophers and the founding father of modern economics, Adam Smith, who in his '*Theory of Moral Sentiments*'(1759) introduced the concept of a '*man of humanity*' to illustrate the tensions between the present and the future. This man hears about an unprecedented earthquake in China and then reflects for a while on the transience of life, and thinks also of the economic consequences for Europe and himself. But then he returns to his normal business. However, if he on that day were to be told that he was to lose his little finger in the near future, he would be tormented at all times and would find no peace. Adam Smith then puts forward a moral dilemma and asks: "*If the injury to or loss of the finger is subjectively so great a catastrophe and the earthquake in China such a minor one, would this mean that the 'man of humanity' would prefer the obliteration of millions to the rescue of this little finger if such a choice existed?*"

Self-interest has over the past decades been the foundation of economic behaviour. But it prompts questions on how to handle effects of actions that influence someone else's well-being without being included in market or price transactions. A well-known example from the early days of the steam engine is the locomotive whose sparks may set in fire the crops cultivated by farmers in land adjacent to railways. Clearly, full compensation costs would have to be paid by the railway company, but as a consequence, more farmers would grow crops near railways, as this might give them a guaranteed income in case of fire, irrespective of the probability of crops being destroyed by bad weather. This situation might lead to a misallocation of scarce resources, as normal entrepreneurial risk would not be included in these transaction costs. To take account of such externalities in the market system, Pigou (1930) introduced the notion of a financial compensation through the principles of taxation, so that all (direct and indirect) costs would be incorporated in the '*measuring rod of money'*. This principle has played a prominent role in

environmental policy, where it is nowadays known as the '*polluter pays principle*'. Would the market system then be able to ensure a sustainable future?

In the post-war thinking on environmental, resource and climate issues various stages can be distinguished:

- the intuitive phase, where mainly anecdotal evidence was presented on environmental decay. A clear example is Rachel Carson's '*Silent Spring*' (1962);
- the systemic phase, where population, resources, environment and growth were analysed from a global systemic perspective. An illustrative contribution is the study of Meadows et al. (1972) on '*The Limits to Growth*';
- the sustainability phase, where the long-run balance for the use of the earth' scarce resources was put in the perspective of both the future and the North-South interests. The seminal study of WCED (1987) heralded a new epoch in environmental thinking. But also at a local and regional scale, various analytical studies on sustainable futures were undertaken (see e.g. Giaoutzi and Nijkamp 1994);
- the climate change phase, in which as of the beginning of the 21st century the focus has been directed towards long-range climatological changes at a worldwide scale.

These global developments have prompted many innovative concepts and policies for a balanced development of our planet. But also at local levels, various initiatives have been launched, such as the sustainable city initiatives (see Nijkamp and Perrels 1994).

In many environmental economic policies at various spatial levels, price and market perspectives have played a dominant role. Market-oriented sustainability policies have largely adopted similar principles, e.g., in resource policies, in emission rights policies etc. This strategy has meant a powerful policy contribution to the achievement of environmentally-benign future developments, and constitutes also a critical part in the implementation of the Kyoto Protocol and subsequent initiatives.

Nevertheless, there are many cases where a straightforward price and market principle on future sustainable developments may be problematic, especially at local or regional levels where areal development is more based on a commonly accepted, multi-stakeholder future perspective – leaving space for much pluriformity in viewpoints on sustainable trajectories – than on a strict system of price or tax incentives. The main issue is then whether under such conditions a sustainable future can be mapped out and ensured.

In the present study, we will adopt a future scenario approach to take care of the sustainability interests of local or regional development plans, in which local or regional stakeholders have an important say. The aim is thus to test the feasibility of scenario analysis for

local or regional sustainable development strategies, using the viewpoints of relevant stakeholders as main anchor points for our analysis.

This paper is organized as follows. In Section 2, we will outline various elements of a sustainable future. Next, Sections 3 and 4 are devoted to the description of various future scenarios, to be applied in five case study areas in Europe. A description of the methodology and of the main findings is offered in Section 5, followed by a concluding section.

2. In Search of a Sustainable Future

> *"Doubt is not a pleasant situation, but certainty is absurd".*
>
> Voltaire (1694-1787)

An avalanche of studies has been published on sustainable development. Many of them have a global or national orientation, while others are more instrumental and policy-oriented in nature. There are also many sectoral-oriented sustainability studies, while we observe an increasing number of spatial sustainability studies, e.g., on sustainable cities or regions.

Sustainability is a hard-to-define concept, but it became popular and very much 'en vogue' after the publication of '*Our Common Future*', also known as the Brundtland Report by WCED in 1987. According to this report, sustainable development refers to a development of countries or regions that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED 1987). Sustainable development is not only limited to environmental aspects, but also includes other developmental issues, such as socio-economic objectives.

Given the fact that sustainable development has a very complex nature from a policy and process perspective, a systemic approach may offer a practical frame of reference. In general, a systems approach aims at portraying the processes and relationships in a complex system that encompass various components which are mutually connected by means of functional, technical, institutional or behavioural linkages (Harvey 1969). Systems thinking advocates the scientific treatment of systems as interlinked units, composed of mutually related elements. According to Hwang (2000), systems thinking enables us to see the overlapping and ever expanding relationships among multi-faceted systems in multiple dimensions, ranging from both problem formulation to problem solving in (organizational) practice. Moreover, Stewart and Ayres (2001) advocate a systems approach in policy making by emphasizing the following points:

- A systems approach offers policy makers a fresh set of perspectives on the integrated fundamentals of policy analysis.

- Policy design is as much a matter of choosing structures and relationships as of choosing instruments.
- Understanding causation means acknowledging two-way influences and the role of complicated feedbacks.

In developing a coherent approach on spatial sustainable development, we have to think first of all about policy-related factors. To favour or enforce sustainable development, appropriate policies, regulations and incentives are needed. However, governments and the focus of policies can change due to several (inter)national socio-economic shifts. But apart from such developments, also the nature of policies and the scope of governance may be important. For example, the level of coherence and seamlessness of political decisions is important to stimulate sustainable development. Efficient incentives, transparency of measures, sustainability goals in all policy fields, as well as regulatory tools can all be seen as factors necessary for success.

These factors can be even more important when the government has to look into the interests of private partners. Public-private partnerships can improve the understanding and trust on both sides and therefore, the uptake of new (innovative) ideas in the business environment, as well as in the public sector. However, this requires interaction between different policy levels (local, regional and national) and between public and private partners.

When thinking in business terms, trust and mutual understanding are very important to change entrepreneurial behaviour. This requires also insight into the behaviour of SMEs and into the structure of existing market networks. It should be noted that the economic structure including ownership issues, the presence of big international firms and the influence of local firms significantly affect the manoeuvre space for sustainable development. In addition, not only the current economic structure, but also the current and future economic business climate is relevant.

It should be added that innovation and change partly depend on social values, social acceptance and absorptive capacity of society. When entrepreneurs and households are aware of the importance of sustainable development, and if they are open to new ideas, then this may induce new developments that are promising for a sustainable future. In addition, also local leadership is an important success factor. Another important aspect of sustainability is the operational and visible quality and quantity of ecological areas and the ecological processes taking place. Synergies between protecting natural/cultural heritage and economic development of tourism and land-based industries can also enforce sustainability success ranging from local to global scales. Moreover, insights into the current state and resilience of local/regional

ecosystems as well as insights into (economic) benefits of ecological values can help decision-making and stimulate balanced sustainable development at various geographical scales.

In our empirical approach described in Section 3 and subsequent sections, we follow a stepwise approach:

- Design and definition of four sustainable development scenarios at a local or regional level, on the basis of five case studies in Europe.
- Identification and assessment of the impacts of these scenarios using the systematics of a multidimensional 'amoeba' diagram (a visualized 'impact matrix').
- Elicitation of the interest of relevant stakeholders by developing a stakeholder's priority scheme ('weighting scheme').
- Performance analysis of each scenario with a view to the identification of the best-fit scenario for a sustainable future, by means of a multi-criteria evaluation analysis.

3. Design of Systemic Scenarios for Sustainable Development

> *"As far as the laws of mathematics refer to reality, they are not certain; and as far as they are certain, they do not refer to reality".*
>
> Albert Einstein

The key issues in applying the concept of sustainable development to the five case studies under consideration are the competitive organization of production and consumption (economic and social), the aim of continuity (institutional and ecological), the consideration of capacity (ecological and economic), and the need of coherence (social and ecological). Clearly, the application of the sustainability concept will lead to different analytical issues and outcomes depending on local circumstances and interests. Therefore, we have deliberately introduced a great diversity in case-studies from different countries in Europe. The aim of this approach is not to make a comparison of findings from different case-studies, but to test the robustness of our analytical apparatus by applying it to different experimental conditions. For this reason, we have consulted different types of stakeholders in five distinct case studies: the forest sector in Finland; a Scottish national park; the Romanian energy sector; a Spanish region addressing sustainable progress, and the agricultural sector in an Italian region. These case studies are meant to provide a complementary view of different sustainability problems in various geographical, environmental, social, economic, developmental and cultural contexts in order to test the potential value of our strategic scenarios for future sustainable development. Before presenting

the definition of scenarios and the methodology used in this paper, we will introduce briefly the sectors targeted in each case study.

Finland: The focus of the sustainability case study in Finland is on the ecosystem and its utilization of forest by humans. This case study is a nation-wide case study for the next 20 years. It focuses on the forest ecosystem, and therefore, the plan covers ecosystem quality and ecosystem wellbeing of forest areas in Finland. The economic aspect of the case study is to analyse the possibilities to regenerate and sustain the ecosystem's quality.

Italy: The aim of this case study is to understand the complex interactions and metabolism of the agricultural sector in Italy. This study focuses on three spatial scales, viz. local scale (farm level, with three farms being selected), regional scale (Campania region) and national scale (Italy).

Romania: The focus of this case study is on the energy sector including the integrated social, economic and environmental aspects. This case study also focuses on the transitional economy at a sectoral level on the basis of the metabolism of the system in terms of its flows of energy, materials and money.

Scotland: This case study focuses on assessing the trends in the Cairngorms National Park (CNP) in Scotland and the implications for this park from the National Park Act via the Cairngorms National Park Plan. The CNP Plan is a strategic spatial planning document that is structured around three main themes: conserving and enhancing the Park, living and working in the Park, and enjoying and understanding the Park. The Plan has 22 strategic objectives to be achieved by the year 2030, as well as 7 policy priorities for action to be achieved by 2012.

Spain: The target of this case study concerns the sustainable development of Catalonia. The aim is to test the possibility of carrying out the analysis of a metabolic pattern across geographic levels using also spatial analysis (data supported by GIS). The goal of this case study through quantitative results is to obtain new insights into technical challenges, the possibility of gathering the required data, and the policy relevance of the results.

In the next section, we will present the definition of our scenarios for the sustainable future of the areas concerned, while subsequently we will discuss the data used for this study.

4. Pluriform Scenarios for a Sustainable Future: Definition and Data Collection

4.1 Definition

This part of our analysis specifies the nature of the scenarios operationalized through the use of empirical stakeholders' questionnaires administered in each of the five cases. The different valuation of stakeholders suggests that there would be great diversity in sustainable futures. Consequently, we have developed four different scenarios with a high degree of pluriformity. These scenarios will now concisely be described.

• ***Scenario 1: Competitiveness (economic and social)****:* The main aim is to reach sustainable development by first improving the economic situation. This means that apart from creating a satisfactory physical system (e.g., infrastructure), uncertainties in, for example, prices will be decreased and the economic diversity of sectors will be optimized. In this way, the economy will be less sensitive to economic crises and income will be more equally distributed. As a result, the quality of social networks will increase, while budgets and technologies are available for the protection of the ecological environment. This will then result in a stronger competitiveness and more sustainable economic development.

• ***Scenario 2: Continuity (institutional and ecological):*** Here the main aim is to protect the natural environment, as well as the diversity of ecosystems. Therefore, it focuses on the increase in ecological quality and the choice of environmentally-friendly sectors for economic development. In order to do so, there is a need for a high level of administrative and management involvement in terms of effectiveness of policies, sustainability inclusion, continuity and integration of institutional systems in the sector at hand and a respect for sustainability. Both continuity in the institutional system and developments related to the ecological system are indispensable.

• ***Scenario 3: Capacity (ecological and economic):*** In this scenario, the main aim is to obtain a high-quality natural environment, as well as a healthy economic and physical environment. By focusing on both economic and ecological development, the environmental capacity of an area will increase. Often these two aims can be integrated by using environmentally-friendly ways of production. This means that producers should not only choose environmentally-safer inputs for production, but should also reduce unnecessary waste and transport movements.

• ***Scenario 4: Coherence (social and ecological):*** The main aim is to first develop the social environment in terms of the quality of social networks, for instance, to increase the awareness of sustainable development in general (e.g., through education) and of the importance of ecological and social networks more specifically. Therefore, investments in education levels and skills to use new technologies are very important to both the young and the elderly generation. As a result, the level of tolerance and openness of society to new developments and the level of involvement and understanding will be increased. This will then lead to the protection of the ecological system and a decrease of negative environmental impacts.

These four scenarios will now be applied to each of our five case studies. To that end, a comprehensive systematic database is necessary.

4.2 Database

We have developed an online questionnaire to trace the different opinions among groups of stakeholders. A digital questionnaire was sent out to carefully selected stakeholders of the five case studies. The questionnaire took about 10 to 15 minutes to complete, and had the aim to collect a wide range of opinions and experiences regarding sustainable development from different stakeholders. The questionnaire consisted of four parts. First, we asked the respondents to express their views on the relative importance of five basic systems compared to each other (pair-wise comparison). Secondly, we asked them to rate various aspects of these five systems. The third part had four scenarios that described how to reach sustainable development. We asked the respondents to allocate 10 points over these four scenarios in order to express their priorities for these scenarios. Finally, we also asked a few personal questions.

In total, 172 questionnaires were filled out: 18 from Finland, 55 from Italy, 52 from Romania, 34 from Scotland, and 13 from Spain. As Figure 1 shows, the biggest group of respondents is associated with academia, especially in Italy. The second biggest group of respondents are those working for the government, in particular in Romania in connection with the energy sector. Most small and large private firms that responded are from Scotland and Romania. Furthermore, in Italy a relatively large number of small firms (farm owners in this case) has responded. The smallest group of stakeholders is the NGO group, which originates mainly from Italy and Scotland. We have also a group of so-called ‘others’, containing the stakeholders who did not fill out information on their own institution, but who did fill out the rest of the form. The category NA (not available), which consists of seven persons, did not provide any personal information (see Figure 1).

The next step in our future sustainability analysis will be a systematic treatment of all data, for each of the five case studies, each of the four scenarios, and each of the relevant policy parameters under consideration. This will be done in the next section.

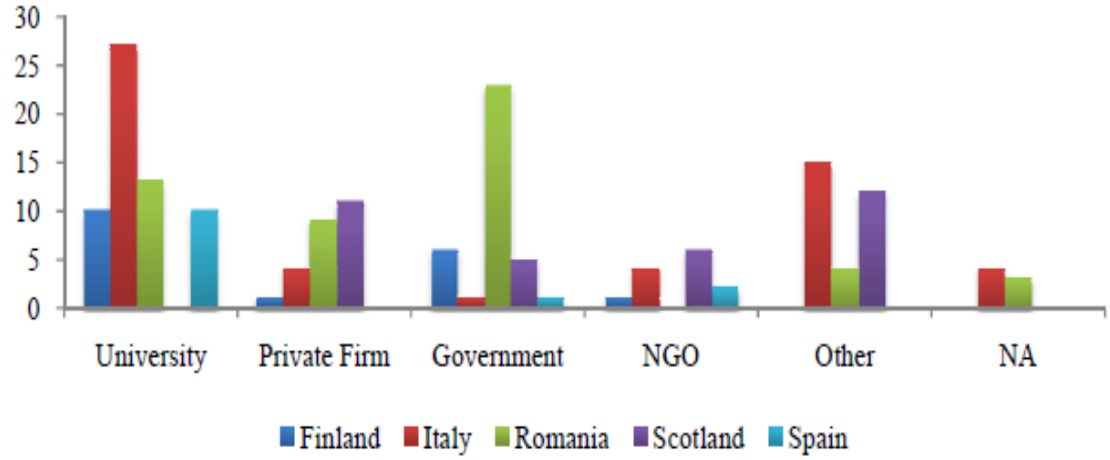

Figure 1. Distribution of stakeholders by institution and country

5. Methodology and Analysis

We have – as mentioned above – defined four distinct sustainable development scenarios in order to identify the best-fit sustainable development scenario, and to see which stakeholders prefer which scenario alternative and how they rank these on the basis of their perceptions and preferences. To that end, we will use an 'amoeba diagram' to map out the various positions. Next, we will apply multi-criteria analysis (MCA) to the results. MCA comprises various classes of decision-making approaches (see for a review Nijkamp et al. 1990). We will now concisely describe these two steps.

5.1 'Amoeba' diagrams

The 'amoeba' diagram is based on a multi-attribute visualization of a composite phenomenon (e.g., a good, a person, a region). It takes for granted that in a comparative sense the most characteristic features of a phenomenon can be depicted in an amoeba-like diagram. The question how many characteristics will be included depends mainly on the aim of the research. In various policy studies (e.g., Capello et al. 1990), it has been demonstrated that in many cases five representative key factors can be distinguished that describe adequately the most critical attributes of a policy alternative. This is known in the literature as the so-called 'pentagon' model. In our empirical study on sustainable development strategies of the five European regions

under consideration, we are also able to distinguish five main drivers of sustainable development (see for details Akgün et al. 2011). The five 'pentagon factors' identified in our comparative case study approach are:

- economic factors
- ecological factors
- physical factors
- social factors
- institutional factors.

Clearly, we have now five pentagon factors, four scenarios and five regions, as well as multiple stakeholders. This means that we have different ways to represent the information in an 'amoeba' diagram, viz. by combining the pentagon factors with either the five regions or with the four scenarios, while priorities for each of the policy factors are obtained from relevant stakeholders. This is visualized in Figures 2 and 3, respectively (see for more details Akgün et al., 2011)

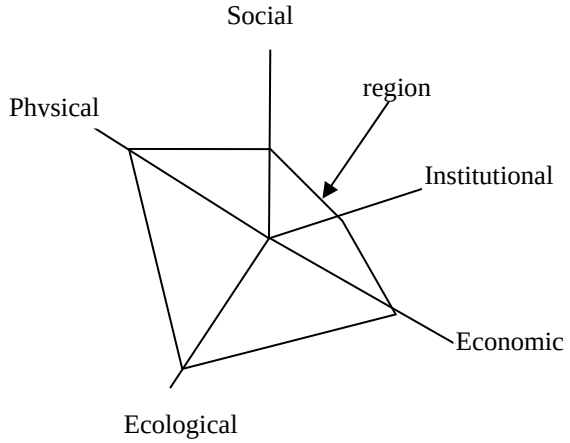

Figure 2. An 'amoeba' diagram for 5 pentagon factors and a given region

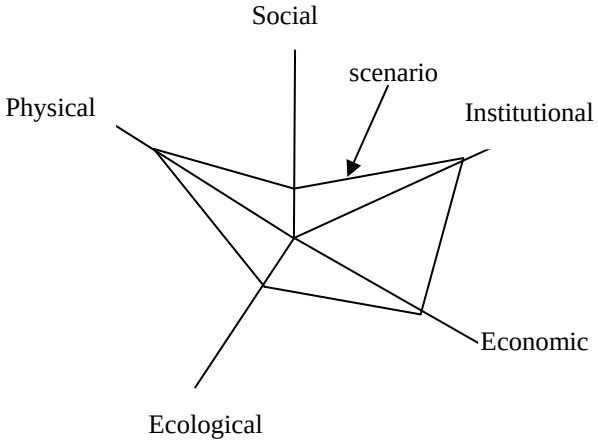

Figure 3. An 'amoeba' diagram for 5 pentagon factors and a given scenario

For the sake of illustration, we will present here some 'amoeba' pictures for our comparative scenario experiment by mapping out the empirical features of both the various classes of stakeholders on the basis of five pentagon factors (see Figures 4 and 5). Apparently, the differences between case-studies are larger than between groups of stakeholders.

Information on these five pentagon factors (in either a cardinal or a ranking system) allows us to use an MCA, in order to identify the most acceptable future scenario (through the use of preferences expressed by stakeholders) or the highest performing regions (or cases) for each of the individual future scenarios. This will be further discussed in Subsection 5.2.

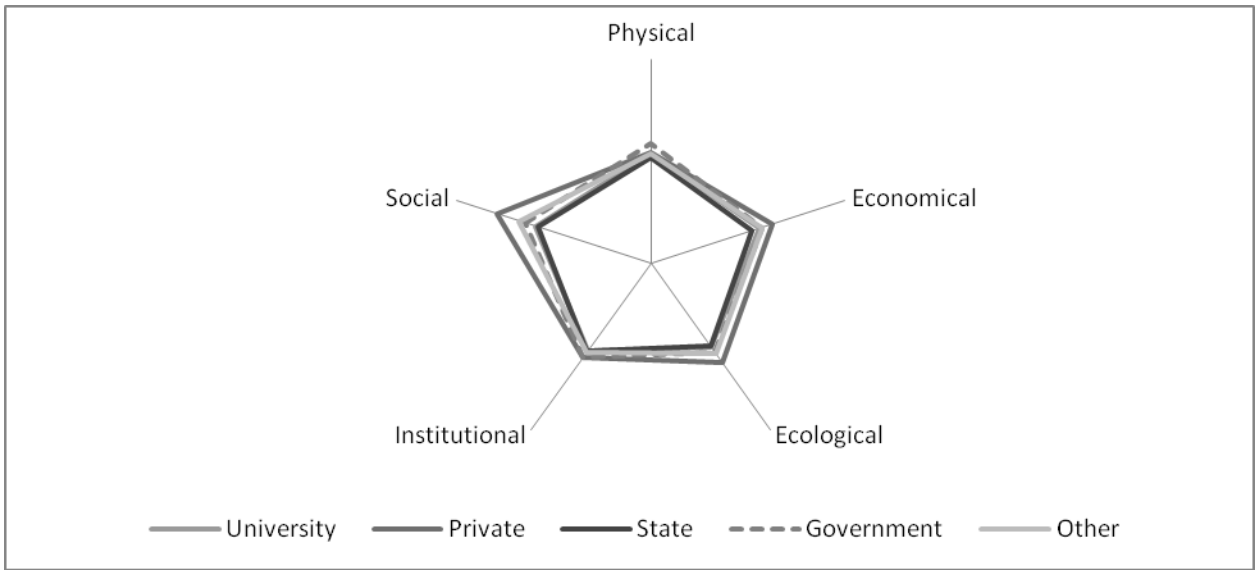

Figure 4. 'Amoeba' picture of pentagon factors by stakeholders'group

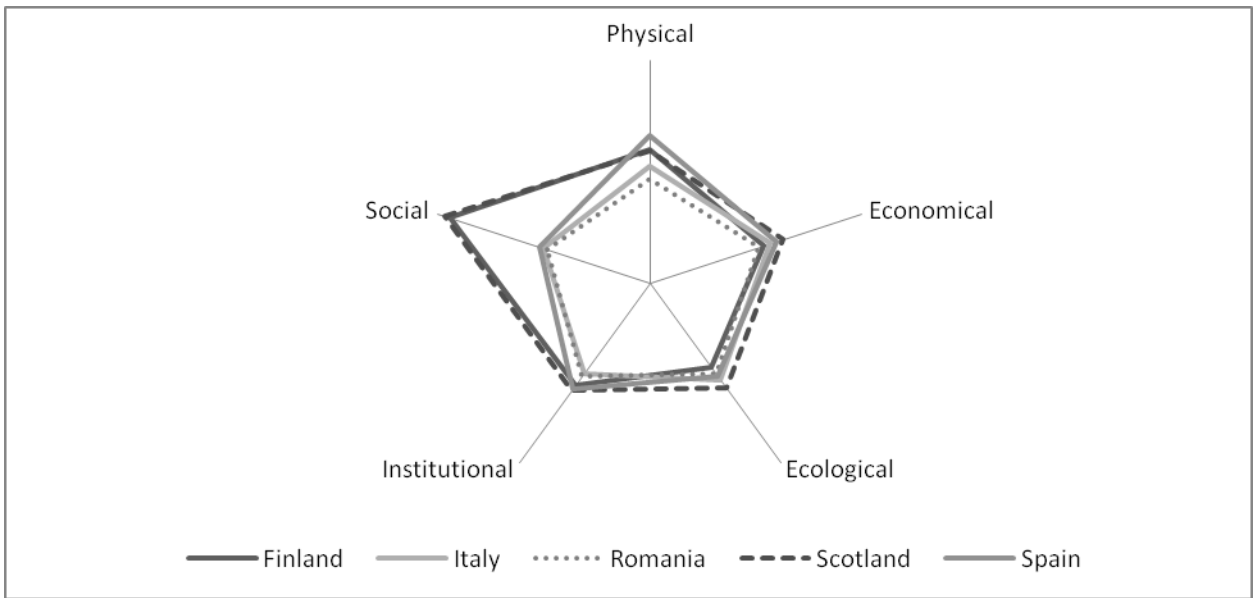

Figure 5. 'Amoeba' picture of pentagon factors by case study

5.2 A multi-criteria model

There are various MCA methods, but in this study we applied the regime method (see for details Nijkamp et al. 1990). The regime method presupposes a distinct set of a-priori defined alternatives and a distinct set of a-priori defined evaluation criteria. For all criteria together this then leads to a so-called 'regime matrix'. Then, by adding a weight vector for each criterion, the relative dominance of each alternative can be assessed in the form of a performance (or success) indicator.

The scenarios differ in the relative importance of each of the five pentagon factors, as is shown in the 'amoeba' diagram. This information was also provided to the respondents. This basically forms thus the well-known MCA impact matrix. For instance, the most important factor for the competitiveness scenario is formed by economic systems. In other words, in the first scenario the main focus is to deal with the economic system to obtain a sustainable future. All other scenarios are also scored by means of these five critical factors in the same way (see for a full presentation in an ordinal format Figure 6**Error! Reference source not found.**).

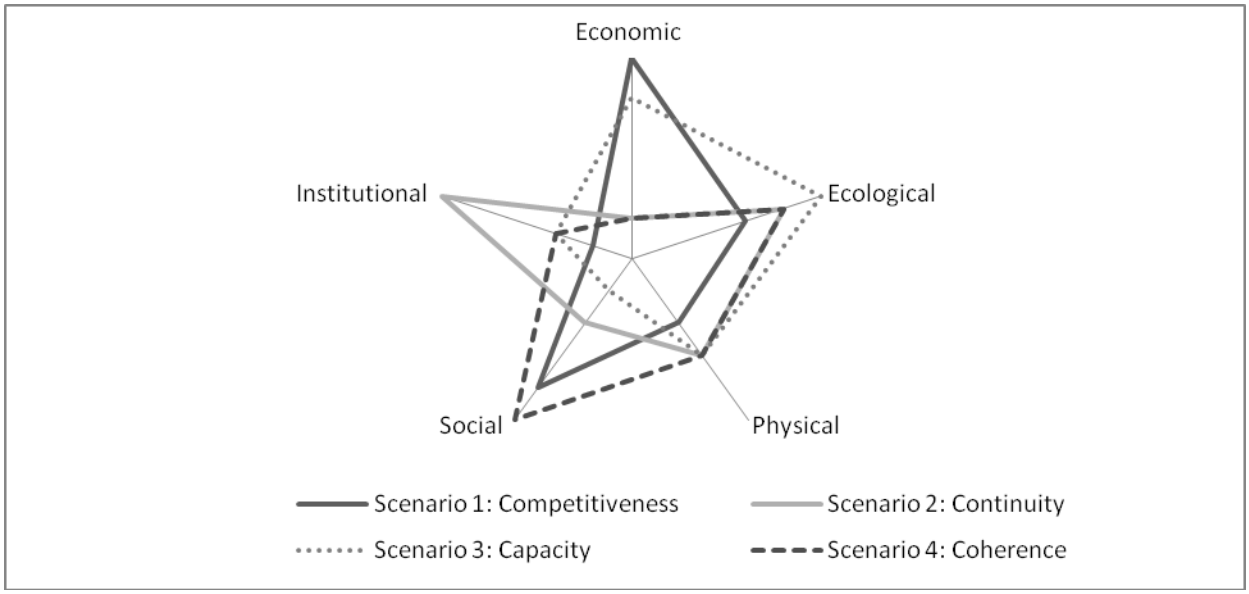

Figure 6. 'Amoeba' diagram of pentagon factors by scenarios

In order to prioritize the factors and understand their critical ranking, we have collected priority data from all stakeholders in the form of pair-wise comparisons. This allows us to calculate the weights for each factor from the perspective of a variety of stakeholders. Weights

calculated from the results of pair-wise comparisons form basically the prioritization rank order of the pentagon factors; and in the literature on regime analysis they are referred to as weights.

By using the weighted average of the pair-wise comparison of different stakeholders, we can generate a prioritization table of pair-wise comparisons, after which the ranking of the factors takes place. In our empirical work, this exercise allowed us to distinguish 11 sets of weights, i.e. priority rankings of the five pentagon factors (Table 1)[1]. During the assessment of these groups, we used an 'equally important' ranking, when the stakeholders were not – or not entirely – consistent in their pair-wise comparison. In other words, when a stakeholder evaluates social systems more important than economic systems, economic systems more important than ecological systems, but ecological systems more important than social systems, this means that the ranking of the stakeholder is inconsistent (violation of 'transitivity' rule); then the relative weight of these factors is ambiguous, and consequently, all factors are equally weighted for this stakeholder. Apparently, he/she cannot decide which one is more important than the other. While constructing the weights distinction, we have thus three classes: 'agree', 'disagree', and 'unsure'. We will now concisely interpret Table 2.

The first group distinguished in Table 2 (i.e. Group 1) is the one where all factors are equally weighted. All factors are thus equal in favour of sustainable development, both among higher-educated groups (high school and bachelor degree graduates) and lower-educated groups. Next, in terms of gender, both female and male stakeholders believe that ecological systems should be given a high priority; these categories are next followed by social systems and physical systems, which are equally important as institutional and economic systems. Among different stakeholder groups, we also included the general view by calculating the average mean of each stakeholder's valuation and named it 'general'. Thus, in general terms, without a differentiation of stakeholders groups, the same ranking as gender and master graduates is given and can be grouped as Group 2. We see almost the same grouping with the criticality of sub-factors of the pentagon factors. For instance, university and state employees have similar preferences, even when other occupations think different.

Table 1. Pair-wise comparisons – Set of weights

	Set of weights	**Group of stakeholder**
Group 1	Ecological=Social=Physical=Institutional=Economical	Education: Bachelor and High school or less Occupation: Students Institution: Other Country: Italy and Romania
Group 2	Ecology>Social>Physical=Institution=Economy	***General***

[1] The order of the groups has no meaning; they are in principle all equally important.

		Gender: Female and Male Education: Master Occupation: Other
Group 3	Ecology>Social >Economy>Physical > Institution	Occupation: Manager
Group 4	Ecology>Social> Institution > Economy >Physical	Education: Doctorate
Group 5	Ecology>Social>Physical>Institution>Economy	Occupation: Researcher
Group 6	Ecology=Social=Physical=Economy>Institution	Education: Other Institution: University and civil servant
Group 7	Social=Physical=Economy>Ecology>Institutional	Institution: NGO
Group 8	Physical>social>Economy>Institutional>Ecology	Institution: Private
Group 9	Ecology>Physical>Social>Institutional>Economy	Country: Finland
Group 10	Ecology=Physical=Institutional=Economy>Social	Country: Scotland
Group 11	Physical>Ecology>Economy= Social= Institutional	Country: Spain

On the basis of the stakeholders' prioritization table (Table 2) and the impact matrix (Table 1), we are now able to run our regime analysis. We have run the regime analysis for each group of pentagon factors separately and organized the table of the performance indicators – in the MCA case – for each group, so that we are able to identify the most preferred scenario from all stakeholders across all five case study areas (see Figure 7). In order to understand the performance of the four scenarios, the choices of the 11 groups of stakeholders are visualized in a histogram.

The numerical interpretation of the bars in the histogram of Figure 5 is as follows. The MCA software used in the regime methods is able to calculate in a cardinal sense (on a scale from 0 to 1 the maximum performance) the relative performance rates of each of the alternatives (e.g., scenarios), based on an underlying ranking system for the stakeholders' preferences for the five pentagon factors. This offers a rather robust quantitative outcome for the comparative analysis of our four scenarios. From the histogram we can easily observe that Scenario 4 (Coherence) is the most preferred one and Scenario 3 (Capacity) is the second most preferred. Scenario 2 (Continuity) and Scenario 1 (Competitiveness) next follow in the rank order, respectively.

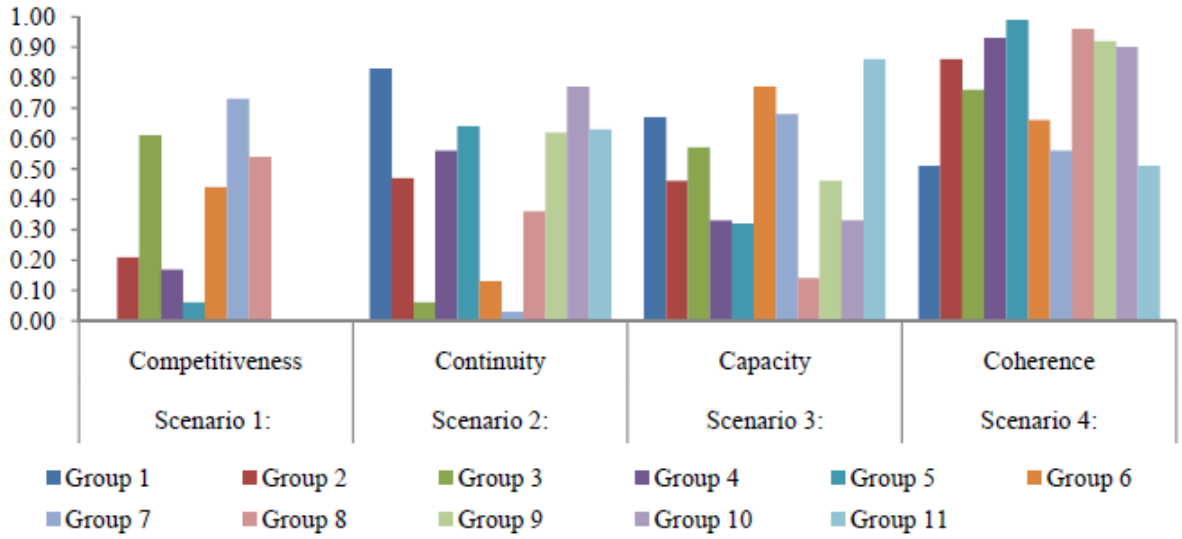

Figure 7. Scenario choices of different stakeholders

It is noteworthy that we can also observe some clear differences between the 11 groups. Scenario 1, for example, is in particular promising for groups 7 and 3, the NGO's and managers, but absolutely not for the first and the last three groups. In addition, it appears that stakeholders grouped by their geographical information do not prefer the first scenario, which stresses Competitiveness as a future sustainable development. These stakeholder groups have a relatively strong interest in a Continuity scenario.

According to the results of the regime analysis, the most preferred sustainable future appears to be the Coherence scenario (Scenario 4), in which ecological and social systems are attached more importance than other sustainability factors. While the third scenario, on Capacity, follows the Coherence scenario; here the most critical factors are economic and ecological factors. In addition, the scenario focusing on the ecological and institutional systems ranks as the third one, while the Competitiveness scenario which does not pay much attention on ecological systems is the least preferred sustainable future image.

On the basis of our stakeholders' preferences, sustainable future development appears to find much support for a basic concern on 'the ecological system', which is next mainly followed by social and economic systems. In other words, policies continuing or planning to focus on ecological aspects of future sustainable environments are strongly supported.

6. Concluding remarks

"The spam problem will be solved in two years"

Bill Gates (2004)

The previous foresight experiments on desirable future sustainability scenarios have demonstrated that a pluriformity perspective – with multiple stakeholders, multiple case studies and multiple strategic policy factors – offers a great potential for a systemic approach to ecological policy, against the background of economic and social factors. The rather unambiguous preference for ecological quality – among different regions and among different stakeholders – is an interesting sign of societal consensus formation, provided that information on choices is provided in a transparent and accessible manner.

Clearly, more solid research on such issues is still needed. In particular, a broad coverage of relevant stakeholders is needed , while also a broader set of empirical case studies would need due attention in follow-up research. And finally, the underlying database – expressed in five pentagon factors and underlying detailed case study data – might need more thorough attention.

References

Akgün, A., E. van Leeuwen and P. Nijkamp, Analytical Support Tools for Sustainable Futures, Research Paper, Dept. of Spatial Economics, VU University, Amsterdam, 2011.

Capello, R., P. Nijkamp and G. Pepping, *Sustainable Cities and Energy Policies*, Springer Verlag, Berlin, 2000.

Carson, R., *Silent Spring*, Houghton Mifflin, Boston,1962.

Giaoutzi, M. and P. Nijkamp, *Decision Support Models for Regional Sustainable Development*, Avebury, Aldershot, 1993.

Giaoutzi, M., A. Stratigea, E. van Leeuwen and P. Nijkamp, Foresight in Agriculture, *International Journal of Sustainable Development*, 2011 (forthcoming).

Harvey, D., *Explanation in Geography*, Edward Arnold, London, 1969.

Hwang, A., Toward Fostering Systems Learning in Organizational Contexts, *Systemic Practice and Action Research*, vol. 13, 2000, pp. 329-343.

Kahn, H., and A.J. Wiener, *The Year 2000*, Beckmans, Stockholm, 1967.

Meadows, D.H., D.L. Meadows, J. Randers and W.H. Behrens III, *The Limits to Growth*, Universe Books, New York, 1972.

Nijkamp, P. and A. Perrels, *Sustainable Cities in Europe*, Earthscan, London, 1994.

Nijkamp, P., P. Rietveld and H. Voogd, *Multicriteria Evaluation in Physical Planning*, North-Holland, Amsterdam, 1990.

Nijkamp, P., S.A. Rienstra and J.M. Vleugel, *Transportation Planning and the Future*, John Wiley, New York, 1998.

Pigou, A., *The Economics of Welfare*, MacMillan, London, 1930.

Rand, A., *Atlas Shrugged*, Random House, New York, 1957.

Smith, A., *The Theory of Moral Sentiments*, A. Miller, London, 1759.

Stewart, J. and R. Ayres, Systems Theory and Policy Practice: An Exploration, *Policy Science*, vol. 34, 2001, pp. 79-94.

Tinbergen, J., *Economic Policy: Principles and Design*, North-Holland, Amsterdam, 1956.

Toffler, A., *Future Shock*, Random House, New York, 1970.

WCED, *Our Common Future*, Oxford University Press, Oxford, 1987.

2009-1	Boriana Rukanova Rolf T. Wignand Yao-Hua Tan	From national to supranational government inter-organizational systems: An extended typology, 33 p.
2009-2	Marc D. Bahlmann Marleen H. Huysman Tom Elfring Peter Groenewegen	Global Pipelines or global buzz? A micro-level approach towards the knowledge-based view of clusters, 33 p.
2009-3	Julie E. Ferguson Marleen H. Huysman	Between ambition and approach: Towards sustainable knowledge management in development organizations, 33 p.
2009-4	Mark G. Leijsen	Why empirical cost functions get scale economies wrong, 11 p.
2009-5	Peter Nijkamp Galit Cohen-Blankshtain	The importance of ICT for cities: e-governance and cyber perceptions, 14 p.
2009-6	Eric de Noronha Vaz Mário Caetano Peter Nijkamp	Trapped between antiquity and urbanism. A multi-criteria assessment model of the greater Cairo metropolitan area, 22 p.
2009-7	Eric de Noronha Vaz Teresa de Noronha Vaz Peter Nijkamp	Spatial analysis for policy evaluation of the rural world: Portuguese agriculture in the last decade, 16 p.
2009-8	Teresa de Noronha Vaz Peter Nijkamp	Multitasking in the rural world: Technological change and sustainability, 20 p.
2009-9	Maria Teresa Borzacchiello Vincenzo Torrieri Peter Nijkamp	An operational information systems architecture for assessing sustainable transportation planning: Principles and design, 17 p.
2009-10	Vincenzo Del Giudice Pierfrancesco De Paola Francesca Torrieri Francesca Pagliari Peter Nijkamp	A decision support system for real estate investment choice, 16 p.
2009-11	Miruna Mazurencu Marinescu Peter Nijkamp	IT companies in rough seas: Predictive factors for bankruptcy risk in Romania, 13 p.
2009-12	Boriana Rukanova Helle Zinner Hendriksen Eveline van Stijn Yao-Hua Tan	Bringing is innovation in a highly-regulated environment: A collective action perspective, 33 p.
2009-13	Patricia van Hemert Peter Nijkamp Jolanda Verbraak	Evaluating social science and humanities knowledge production: an exploratory analysis of dynamics in science systems, 20 p.

2009-14	Roberto Patuelli Aura Reggiani Peter Nijkamp Norbert Schanne	Neural networks for cross-sectional employment forecasts: A comparison of model specifications for Germany, 15 p.
2009-15	André de Waal Karima Kourtit Peter Nijkamp	The relationship between the level of completeness of a strategic performance management system and perceived advantages and disadvantages, 19 p.
2009-16	Vincenzo Punzo Vincenzo Torrieri Maria Teresa Borzacchiello Biagio Ciuffo Peter Nijkamp	Modelling intermodal re-balance and integration: planning a sub-lagoon tube for Venezia, 24 p.
2009-17	Peter Nijkamp Roger Stough Mediha Sahin	Impact of social and human capital on business performance of migrant entrepreneurs – a comparative Dutch-US study, 31 p.
2009-18	Dres Creal	A survey of sequential Monte Carlo methods for economics and finance, 54 p.
2009-19	Karima Kourtit André de Waal	Strategic performance management in practice: Advantages, disadvantages and reasons for use, 15 p.
2009-20	Karima Kourtit André de Waal Peter Nijkamp	Strategic performance management and creative industry, 17 p.
2009-21	Eric de Noronha Vaz Peter Nijkamp	Historico-cultural sustainability and urban dynamics – a geo-information science approach to the Algarve area, 25 p.
2009-22	Roberta Capello Peter Nijkamp	Regional growth and development theories revisited, 19 p.
2009-23	M. Francesca Cracolici Miranda Cuffaro Peter Nijkamp	Tourism sustainability and economic efficiency – a statistical analysis of Italian provinces, 14 p.
2009-24	Caroline A. Rodenburg Peter Nijkamp Henri L.F. de Groot Erik T. Verhoef	Valuation of multifunctional land use by commercial investors: A case study on the Amsterdam Zuidas mega-project, 21 p.
2009-25	Katrin Oltmer Peter Nijkamp Raymond Florax Floor Brouwer	Sustainability and agri-environmental policy in the European Union: A meta-analytic investigation, 26 p.
2009-26	Francesca Torrieri Peter Nijkamp	Scenario analysis in spatial impact assessment: A methodological approach, 20 p.
2009-27	Aliye Ahu Gülümser Tüzin Baycan-Levent Peter Nijkamp	Beauty is in the eyes of the beholder: A logistic regression analysis of sustainability and locality as competitive vehicles for human settlements, 14 p.

2009-28	Marco Percoco Peter Nijkamp	Individual time preferences and social discounting in environmental projects, 24 p.
2009-29	Peter Nijkamp Maria Abreu	Regional development theory, 12 p.
2009-30	Tüzin Baycan-Levent Peter Nijkamp	7 FAQs in urban planning, 22 p.
2009-31	Aliye Ahu Gülümser Tüzin Baycan-Levent Peter Nijkamp	Turkey's rurality: A comparative analysis at the EU level, 22 p.
2009-32	Frank Bruinsma Karima Kourtit Peter Nijkamp	An agent-based decision support model for the development of e-services in the tourist sector, 21 p.
2009-33	Mediha Sahin Peter Nijkamp Marius Rietdijk	Cultural diversity and urban innovativeness: Personal and business characteristics of urban migrant entrepreneurs, 27 p.
2009-34	Peter Nijkamp Mediha Sahin	Performance indicators of urban migrant entrepreneurship in the Netherlands, 28 p.
2009-35	Manfred M. Fischer Peter Nijkamp	Entrepreneurship and regional development, 23 p.
2009-36	Faroek Lazrak Peter Nijkamp Piet Rietveld Jan Rouwendal	Cultural heritage and creative cities: An economic evaluation perspective, 20 p.
2009-37	Enno Masurel Peter Nijkamp	Bridging the gap between institutions of higher education and small and medium-size enterprises, 32 p.
2009-38	Francesca Medda Peter Nijkamp Piet Rietveld	Dynamic effects of external and private transport costs on urban shape: A morphogenetic perspective, 17 p.
2009-39	Roberta Capello Peter Nijkamp	Urban economics at a cross-yard: Recent theoretical and methodological directions and future challenges, 16 p.
2009-40	Enno Masurel Peter Nijkamp	The low participation of urban migrant entrepreneurs: Reasons and perceptions of weak institutional embeddedness, 23 p.
2009-41	Patricia van Hemert Peter Nijkamp	Knowledge investments, business R&D and innovativeness of countries. A qualitative meta-analytic comparison, 25 p.
2009-42	Teresa de Noronha Vaz Peter Nijkamp	Knowledge and innovation: The strings between global and local dimensions of sustainable growth, 16 p.
2009-43	Chiara M. Travisi Peter Nijkamp	Managing environmental risk in agriculture: A systematic perspective on the potential of quantitative policy-oriented risk valuation, 19 p.
2009-44	Sander de Leeuw	Logistics aspects of emergency preparedness in flood disaster prevention, 24 p.

	Iris F.A. Vis Sebastiaan B. Jonkman	
2009-45	Eveline S. van Leeuwen Peter Nijkamp	Social accounting matrices. The development and application of SAMs at the local level, 26 p.
2009-46	Tibert Verhagen Willemijn van Dolen	The influence of online store characteristics on consumer impulsive decision-making: A model and empirical application, 33 p.
2009-47	Eveline van Leeuwen Peter Nijkamp	A micro-simulation model for e-services in cultural heritage tourism, 23 p.
2009-48	Andrea Caragliu Chiara Del Bo Peter Nijkamp	Smart cities in Europe, 15 p.
2009-49	Faroek Lazrak Peter Nijkamp Piet Rietveld Jan Rouwendal	Cultural heritage: Hedonic prices for non-market values, 11 p.
2009-50	Eric de Noronha Vaz João Pedro Bernardes Peter Nijkamp	Past landscapes for the reconstruction of Roman land use: Eco-history tourism in the Algarve, 23 p.
2009-51	Eveline van Leeuwen Peter Nijkamp Teresa de Noronha Vaz	The Multi-functional use of urban green space, 12 p.
2009-52	Peter Bakker Carl Koopmans Peter Nijkamp	Appraisal of integrated transport policies, 20 p.
2009-53	Luca De Angelis Leonard J. Paas	The dynamics analysis and prediction of stock markets through the latent Markov model, 29 p.
2009-54	Jan Anne Annema Carl Koopmans	Een lastige praktijk: Ervaringen met waarderen van omgevingskwaliteit in de kosten-batenanalyse, 17 p.
2009-55	Bas Straathof Gert-Jan Linders	Europe's internal market at fifty: Over the hill? 39 p.
2009-56	Joaquim A.S. Gromicho Jelke J. van Hoorn Francisco Saldanha-da-Gama Gerrit T. Timmer	Exponentially better than brute force: solving the job-shop scheduling problem optimally by dynamic programming, 14 p.
2009-57	Carmen Lee Roman Kraeussl Leo Paas	The effect of anticipated and experienced regret and pride on investors' future selling decisions, 31 p.
2009-58	René Sitters	Efficient algorithms for average completion time scheduling, 17 p.

2009-59	Masood Gheasi Peter Nijkamp Piet Rietveld	Migration and tourist flows, 20 p.

2010-1	Roberto Patuelli Norbert Schanne Daniel A. Griffith Peter Nijkamp	Persistent disparities in regional unemployment: Application of a spatial filtering approach to local labour markets in Germany, 28 p.
2010-2	Thomas de Graaff Ghebre Debrezion Piet Rietveld	Schaalsprong Almere. Het effect van bereikbaarheidsverbeteringen op de huizenprijzen in Almere, 22 p.
2010-3	John Steenbruggen Maria Teresa Borzacchiello Peter Nijkamp Henk Scholten	Real-time data from mobile phone networks for urban incidence and traffic management – a review of application and opportunities, 23 p.
2010-4	Marc D. Bahlmann Tom Elfring Peter Groenewegen Marleen H. Huysman	Does distance matter? An ego-network approach towards the knowledge-based theory of clusters, 31 p.
2010-5	Jelke J. van Hoorn	A note on the worst case complexity for the capacitated vehicle routing problem, 3 p.
2010-6	Mark G. Lijesen	Empirical applications of spatial competition; an interpretative literature review, 16 p.
2010-7	Carmen Lee Roman Kraeussl Leo Paas	Personality and investment: Personality differences affect investors' adaptation to losses, 28 p.
2010-8	Nahom Ghebrihiwet Evgenia Motchenkova	Leniency programs in the presence of judicial errors, 21 p.
2010-9	Meindert J. Flikkema Ard-Pieter de Man Matthijs Wolters	New trademark registration as an indicator of innovation: results of an explorative study of Benelux trademark data, 53 p.
2010-10	Jani Merikivi Tibert Verhagen Frans Feldberg	Having belief(s) in social virtual worlds: A decomposed approach, 37 p.
2010-11	Umut Kilinç	Price-cost markups and productivity dynamics of entrant plants, 34 p.
2010-12	Umut Kilinç	Measuring competition in a frictional economy, 39 p.

2011-1	Yoshifumi Takahashi Peter Nijkamp	Multifunctional agricultural land use in sustainable world, 25 p.
2011-2	Paulo A.L.D. Nunes Peter Nijkamp	Biodiversity: Economic perspectives, 37 p.
2011-3	Eric de Noronha Vaz Doan Nainggolan Peter Nijkamp Marco Painho	A complex spatial systems analysis of tourism and urban sprawl in the Algarve, 23 p.
2011-4	Karima Kourtit Peter Nijkamp	Strangers on the move. Ethnic entrepreneurs as urban change actors, 34 p.
2011-5	Manie Geyer Helen C. Coetzee Danie Du Plessis Ronnie Donaldson Peter Nijkamp	Recent business transformation in intermediate-sized cities in South Africa, 30 p.
2011-6	Aki Kangasharju Christophe Tavéra Peter Nijkamp	Regional growth and unemployment. The validity of Okun's law for the Finnish regions, 17 p.
2011-7	Amitrajeet A. Batabyal Peter Nijkamp	A Schumpeterian model of entrepreneurship, innovation, and regional economic growth, 30 p.
2011-8	Aliye Ahu Akgün Tüzin Baycan Levent Peter Nijkamp	The engine of sustainable rural development: Embeddedness of entrepreneurs in rural Turkey, 17 p.
2011-9	Aliye Ahu Akgün Eveline van Leeuwen Peter Nijkamp	A systemic perspective on multi-stakeholder sustainable development strategies, 26 p.
2011-10	Tibert Verhagen Jaap van Nes Frans Feldberg Willemijn van Dolen	Virtual customer service agents: Using social presence and personalization to shape online service encounters, 48 p.
2011-11	Henk J. Scholten Maarten van der Vlist	De inrichting van crisisbeheersing, de relatie tussen besluitvorming en informatievoorziening. Casus: Warroom project Netcentrisch werken bij Rijkswaterstaat, 23 p.
2011-12	Tüzin Baycan Peter Nijkamp	A socio-economic impact analysis of cultural diversity, 22 p.
2011-13	Aliye Ahu Akgün Tüzin Baycan Peter Nijkamp	Repositioning rural areas as promising future hot spots, 22 p.
2011-14	Selmar Meents Tibert Verhagen Paul Vlaar	How sellers can stimulate purchasing in electronic marketplaces: Using information as a risk reduction signal, 29 p.

2011-15	Aliye Ahu Gülümser Tüzin Baycan-Levent Peter Nijkamp	Measuring regional creative capacity: A literature review for rural-specific approaches, 22 p.
2011-16	Frank Bruinsma Karima Kourtit Peter Nijkamp	Tourism, culture and e-services: Evaluation of e-services packages, 30 p.
2011-17	Peter Nijkamp Frank Bruinsma Karima Kourtit Eveline van Leeuwen	Supply of and demand for e-services in the cultural sector: Combining top-down and bottom-up perspectives, 16 p.
2011-18	Eveline van Leeuwen Peter Nijkamp Piet Rietveld	Climate change: From global concern to regional challenge, 17 p.
2011-19	Eveline van Leeuwen Peter Nijkamp	Operational advances in tourism research, 25 p.
2011-20	Aliye Ahu Akgün Tüzin Baycan Peter Nijkamp	Creative capacity for sustainable development: A comparative analysis of European and Turkish rural regions, 18 p.
2011-21	Aliye Ahu Gülümser Tüzin Baycan-Levent Peter Nijkamp	Business dynamics as the source of counterurbanisation: An empirical analysis of Turkey, 18 p.
2011-22	Jessie Bakens Peter Nijkamp	Lessons from migration impact analysis, 19 p.
2011-23	Peter Nijkamp Galit Cohen-blankshtain	Opportunities and pitfalls of local e-democracy, 17 p.
2011-24	Maura Soekijad Irene Skovgaard Smith	The ‘lean people’ in hospital change: Identity work as social differentiation, 30 p.
2011-25	Evgenia Motchenkova Olgerd Rus	Research joint ventures and price collusion: Joint analysis of the impact of R&D subsidies and antitrust fines, 30 p.
2011-26	Karima Kourtit Peter Nijkamp	Strategic choice analysis by expert panels for migration impact assessment, 41 p.
2011-27	Faroek Lazrak Peter Nijkamp Piet Rietveld Jan Rouwendal	The market value of listed heritage: An urban economic application of spatial hedonic pricing, 24 p.
2011-28	Peter Nijkamp	Socio-economic impacts of heterogeneity among foreign migrants: Research and policy challenges, 17 p.
2011-29	Masood Gheasi Peter Nijkamp	Migration, tourism and international trade: Evidence from the UK, 8 p.
2011-30	Karima Kourtit	Evaluation of cyber-tools in cultural tourism, 24 p.

	Peter Nijkamp Eveline van Leeuwen Frank Bruinsma	
2011-31	Cathy Macharis Peter Nijkamp	Possible bias in multi-actor multi-criteria transportation evaluation: Issues and solutions, 16 p.
2011-32	John Steenbruggen Maria Teresa Borzacchiello Peter Nijkamp Henk Scholten	The use of GSM data for transport safety management: An exploratory review, 29 p.
2011-33	John Steenbruggen Peter Nijkamp Jan M. Smits Michel Grothe	Traffic incident management: A common operational picture to support situational awareness of sustainable mobility, 36 p.
2011-34	Tüzin Baycan Peter Nijkamp	Students' interest in an entrepreneurial career in a multicultural society, 25 p.
2011-35	Adele Finco Deborah Bentivoglio Peter Nijkamp	Integrated evaluation of biofuel production options in agriculture: An exploration of sustainable policy scenarios, 16 p.
2011-36	Eric de Noronha Vaz Pedro Cabral Mário Caetano Peter Nijkamp Marco Paínho	Urban heritage endangerment at the interface of future cities and past heritage: A spatial vulnerability assessment, 25 p.
2011-37	Maria Giaoutzi Anastasia Stratigea Eveline van Leeuwen Peter Nijkamp	Scenario analysis in foresight: AG2020, 23 p.
2011-38	Peter Nijkamp Patricia van Hemert	Knowledge infrastructure and regional growth, 12 p.
2011-39	Patricia van Hemert Enno Masurel Peter Nijkamp	The role of knowledge sources of SME's for innovation perception and regional innovation policy, 27 p.
2011-40	Eric de Noronha Vaz Marco Painho Peter Nijkamp	Impacts of environmental law and regulations on agricultural land-use change and urban pressure: The Algarve case, 18 p.
2011-41	Karima Kourtit Peter Nijkamp Steef Lowik Frans van Vught Paul Vulto	From islands of innovation to creative hotspots, 26 p.
2011-42	Alina Todiras Peter Nijkamp Saidas Rafijevas	Innovative marketing strategies for national industrial flagships: Brand repositioning for accessing upscale markets, 27 p.

2011-43	Eric de Noronha Vaz Mário Caetano Peter Nijkamp	A multi-level spatial urban pressure analysis of the Giza Pyramid Plateau in Egypt, 18 p.
2011-44	Andrea Caragliu Chiara Del Bo Peter Nijkamp	A map of human capital in European cities, 36 p.
2011-45	Patrizia Lombardi Silvia Giordano Andrea Caragliu Chiara Del Bo Mark Deakin Peter Nijkamp Karima Kourtit	An advanced triple-helix network model for smart cities performance, 22 p.
2011-46	Jessie Bakens Peter Nijkamp	Migrant heterogeneity and urban development: A conceptual analysis, 17 p.
2011-47	Irene Casas Maria Teresa Borzacchiello Biagio Ciuffo Peter Nijkamp	Short and long term effects of sustainable mobility policy: An exploratory case study, 20 p.
2011-48	Christian Bogmans	Can globalization outweigh free-riding? 27 p.
2011-49	Karim Abbas Bernd Heidergott Djamil Aïssani	A Taylor series expansion approach to the functional approximation of finite queues, 26 p.
2011-50	Eric Koomen	Indicators of rural vitality. A GIS-based analysis of socio-economic development of the rural Netherlands, 17 p.

2012-1	Aliye Ahu Gülümser Tüzin Baycan Levent Peter Nijkamp Jacques Poot	The role of local and newcomer entrepreneurs in rural development: A comparative meta-analytic study, 39 p.
2012-2	Joao Romao Bart Neuts Peter Nijkamp Eveline van Leeuwen	Urban tourist complexes as Multi-product companies: Market segmentation and product differentiation in Amsterdam, 18 p.
2012-3	Vincent A.C. van den Berg	Step tolling with price sensitive demand: Why more steps in the toll makes the consumer better off, 20 p.
2012-4	Vasco Diogo Eric Koomen Floor van der Hilst	Second generation biofuel production in the Netherlands. A spatially-explicit exploration of the economic viability of a perennial biofuel crop, 12 p.
2012-5	Thijs Dekker Paul Koster Roy Brouwer	Changing with the tide: Semi-parametric estimation of preference dynamics, 50 p.
2012-6	Daniel Arribas Karima Kourtit Peter Nijkamp	Benchmarking of world cities through self-organizing maps, 22 p.
2012-7	Karima Kourtit Peter Nijkamp Frans van Vught Paul Vulto	Supernova stars in knowledge-based regions, 24 p.
2012-8	Mediha Sahin Tüzin Baycan Peter Nijkamp	The economic importance of migrant entrepreneurship: An application of data envelopment analysis in the Netherlands, 16 p.
2012-9	Peter Nijkamp Jacques Poot	Migration impact assessment: A state of the art, 48 p.
2012-10	Tibert Verhagen Anniek Nauta Frans Feldberg	Negative online word-of-mouth: Behavioral indicator or emotional release? 29 p.

2013-1	Tüzin Baycan Peter Nijkamp	The migration development nexus: New perspectives and challenges, 22 p.
2013-2	Haralambie Leahu	European Options Sensitivities via Monte Carlo Techniques, 28 p.
2013-3	Tibert Verhagen Charlotte Vonkeman Frans Feldberg Plon Verhagen	Making online products more tangible and likeable: The role of local presence as product presentation mechanism, 44 p.
2013-4	Aliye Ahu Akgün Eveline van Leeuwen Peter Nijkamp	A Multi-actor multi-criteria scenario analysis of regional sustainable resource policy, 24 p.
2013-5	John Steenbruggen Peter Nijkamp Maarten van der Vlist	Urban traffic incident management in a digital society. An actor-network approach in information technology use in urban Europe, 25 p.
2013-6	Jorge Ridderstaat Robertico Croes Peter Nijkamp	The force field of tourism, 19 p.
2013-7	Masood Gheasi Peter Nijkamp Piet Rietveld	Unknown diversity: A study on undocumented migrant workers in the Dutch household sector, 17 p.
2013-8	Mediha Sahin Peter Nijkamp Soushi Suzuki	Survival of the fittest among migrant entrepreneurs. A study on differences in the efficiency performance of migrant entrepreneurs in Amsterdam by means of data envelopment analysis, 25 p.
2013-9	Kostas Bithas Peter Nijkamp	Biological integrity as a prerequisite for sustainable development: A bioeconomic perspective, 24 p.
2013-10	Madalina-Stefania Dirzu Peter Nijkamp	The dynamics of agglomeration processes and their contribution to regional development across the EU, 19 p.
2013-11	Eric de Noronha Vaz Agnieszka Walczynska Peter Nijkamp	Regional challenges in tourist wetland systems: An integrated approach to the Ria Formosa area, 17 p.
2013-12	João Romão Eveline van Leeuwen Bart Neuts Peter Nijkamp	Tourist loyalty and urban e-services: A comparison of behavioural impacts in Leipzig and Amsterdam, 19 p.
2013-13	Jorge Ridderstaat Marck Oduber Robertico Croes Peter Nijkamp Pim Martens	Impacts of seasonal patterns of climate on recurrent fluctuations in tourism demand. Evidence from Aruba, 34 p.
2013-14	Emmanouil Tranos Peter Nijkamp	Urban and regional analysis and the digital revolution: Challenges and opportunities, 16 p.
2013-15	Masood Gheasi	International financial transfer by foreign labour: An analysis of remittances

	Peter Nijkamp Piet Rietveld	from informal migrants, 11 p.
2013-16	Serenella Sala Biagio Ciuffo Peter Nijkamp	A meta-framework for sustainability assessment, 24 p.
2013-17	Eveline van Leeuwen Peter Nijkamp Aliye Ahu Akgün Masood Gheasi	Foresights, scenarios and sustainable development – a pluriformity perspective, 19 p.