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Urban Green Space Policies: Performance and Success Conditions in European Cities

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PRELIMINARY VERSION

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Urban Green Space Policies: Performance and Success Conditions in European Cities

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Abstract

Urban green spaces play a key role in improving the liveability of our towns and cities. The quality and viability of cities depend largely on the design, management and maintenance of urban green as well as of open and public spaces in order to fulfil their role as an important social constellation and a visual focus. Actually, urban green spaces are seen as an important contribution to a sustainable development of cities. However, the potential of green spaces is not always realized, so that current management practices are sometimes sub-optimal. From a *policy perspective*, the results of several case studies have shown important needs and priorities for the development and management of urban green spaces. It is of strategic importance to compare and evaluate urban green space policies for highlighting the *best practices* for relevant policy recommendations and guidance for society and planning authorities to improve the quality of life in cities.

The present study investigates urban green spaces from a policy evaluation perspective and analyses European cities in order to obtain strategic and policy relevant information on the key features of urban green. The study aims to compare and evaluate the current management practices in European cities on the basis of the performance of urban green space policies. The data and information used for comparison and evaluation are based on extensive survey questionnaires filled out by relevant departments or experts of municipalities in European cities that aim to share their experience in innovative green space policies and strategies. A recently developed artificial intelligence method is deployed to assess and identify the most important factors that are responsible for successes and failures of urban green space policies. This approach reveals the most critical policy variables.

1. Introduction

The concept of sustainability has become an important paradigm in urban planning, in particular since a high proportion of the world's production, consumption and waste generation is concentrated in cities. Therefore, a general concern for quality of life and sustainability, with a particular focus on the city, has emerged at a world-wide scale. Societies have become concerned with the built or man-made environment and with protecting or shaping nature in urban areas, and this has led to specific landscape patterns in the countryside as well as to the creation of parks and gardens in urban areas (MacHarg, 1971, Roelofs, 1999, Turner et al. 1999).

Urban green spaces play a key role in improving the liveability of our towns and cities. The quality and viability of cities largely depend on the design, management and maintenance of urban green as well as of open and public spaces in order to fulfil their role as an important social and visual focus. The quality of green spaces helps to define the identity of towns and cities, which can enhance their attractiveness for living, working, investment and tourism. Therefore, urban green can contribute positively to the competitiveness of cities.

Despite the great benefits that urban green spaces provide there is a serious lack of information about the quantity and quality of urban green spaces. From a *policy perspective*, the results of several case studies showed important needs and priorities for the development and management of urban green spaces. Among these needs for planning and management of urban green spaces the following factors can be mentioned:

First, to improve the quality of urban green spaces an informative database is needed. However, there is a serious lack of information about the quantity and quality of urban green spaces. Information on the quantity and quality of green spaces within urban areas is incomplete and fragmented. There is no single source and no single accurate set of figures.

Second, urban green and open space planning policies need to be determined locally in order to satisfy local needs and to assist in the achievement of national and international objectives.

Third, more integrated approaches and the active involvement of the community for the development and management of urban green spaces are needed. A collaborative and

enabling partnership among local authorities, local businesses and voluntary groups is also important in this process.

Fourth, most development plans adopt a simple, population-based standard approach to the need for green space in new housing developments and they largely ignore the other green spaces as part of other developments such as industry, leisure, etc. It is desirable that the planning authorities develop their own local standards for green spaces not only in new housing developments but also in non-housing developments, such as industry and business.

Fifth, quantity, quality and accessibility of green spaces in order to form the basis for a vision for urban green space are needed. Therefore, it is of strategic importance to compare and evaluate urban green space policies for highlighting the “best practices” for relevant policy recommendations and guidance for society and planning authorities to improve the quality of life in cities.

Against this background, the present study investigates urban green spaces from a policy evaluation perspective and analyses European cities in order to obtain strategic and policy relevant information on the key features of urban green. The study aims to compare and evaluate the current management practices in European cities on the basis of the performance of urban green space policies. The next section evaluates “urban green” from a multidimensional approach including ecological, social, economic and planning perspectives. Section 3 gives a description of the study and introduces the artificial intelligence method by means of rough set analysis which is deployed to assess and identify the most important factors that are responsible for successes and failures of urban green space policies. Section 4 compares “*green performance*” of European cities in terms of the present situation and priorities in decision-making and planning on the basis of the empirical results of the rough set analysis. The final section offers some concluding remarks that focus on the critical aspects of green planning policies.

2. Urban green spaces

Urban green spaces provide a range of benefits at both the national and the local level and offer many use opportunities to people in different ways. They help to define and support the identity of towns and cities, which can enhance their attractiveness for living, working,

investment and tourism. Therefore, they can contribute positively to the competitiveness of cities. On the other hand, urban green spaces have many contributions to social and economic life, and to the ecological and planning system, and as a whole to the urban quality of life. Many studies refer to the contributions of urban green spaces from several perspectives including social, economic, ecological or planning dimensions (Baycan-Levent and Nijkamp, 2002, 2004, Baycan-Levent et al., 2003, Dole, 1989; De Groot, 1994; DTLR, 2001; Jacobs, 1961; Hart, 1997; Hough, 1984; Hueting, 1970; Priemus, 1999; Rodenburg et al., 2002, Scottish Executive, 2001; Stanners and Bourdeau, 1995).

From a ***social perspective***, particular types of green space can offer a bigger diversity of land uses and opportunities for a wide range of activities, help to foster active lifestyles, and can be of real benefit to health. Well- managed and maintained green spaces contribute to social justice by creating opportunities for people of all ages to interact (Scottish Executive, 2001). Urban green spaces emphasise the diversity of urban areas by reflecting the different communities they serve and meeting their varying needs. They enhance cultural life by providing venues for local festivals, civic celebrations and theatrical performances. Urban green spaces provide safe play space for children (Jacobs, 1961, cited in Haughton and Hunter, 1994), contribute to children's physical, mental and social development (Hart, 1997) and play an important role in the basic education of schoolchildren with regard to the environment and nature.

From a ***planning perspective***, a network of high quality green spaces linking residential areas with business, retail and leisure developments can help to improve the accessibility and attractiveness of local facilities and employment centres. Well-designed networks of green spaces help to encourage people to travel safely by foot or by bicycle for recreation or commuting (Scottish Executive, 2001). Furthermore, well-designed urban green spaces provide a barrier to noise and can function as a visual screen (Dole, 1989, cited in Haughton and Hunter, 1994).

From an ***economic perspective***, a green space might deliver products such as wood or fruits and also compost and energy as a result of urban green production. Their presence can create an increase in the economic value of an area and provides new jobs.

From an *ecological perspective*, urban green spaces moderate the impact of human activities by, for example, absorbing pollutants and releasing oxygen (Hough, 1984, cited in Haughton and Hunter, 1994), contribute to the maintenance of a healthy urban environment by providing clean air, water and soil (De Groot, 1994), improve the urban climate and maintain the balance of the city's natural urban environment (Stanners and Bourdeau, 1995). They preserve the local natural and cultural heritage by providing habitats for a diversity of urban wildlife and conserve a diversity of urban resources. Despite the enormous benefits that urban green spaces provide there is a serious lack of information about the quantity and quality of urban green spaces. However, with the new integrated approaches to combine strategic planning for green spaces with innovative design and delivery and the active involvement of the community at all stages, urban green spaces can be part of an '*urban renaissance*' (DTLR, 2001).

3. Evaluation of urban green space policies

The present study investigates urban green spaces from a policy evaluation perspective and analyses European cities in order to obtain strategic and policy relevant information on the key features of urban green. The study aims to compare and evaluate the current management practices in European cities by means of the perception of relevant decision makers regarding performance of urban green space policies. The data and information used for comparison and evaluation are based on extensive survey questionnaires filled out by relevant departments or experts of municipalities in European cities that aim to share their experience in innovative green space policies and strategies. A recently developed artificial intelligence method, viz. *rough set analysis* is deployed to assess and identify the most important factors that are responsible for successes and failures of urban green space policies. In the next sub-section (Sub-section 3.1.) we explain the rough set analysis which is a qualitative multivariate decision-analytical classification method that originates from the artificial intelligence literature and then next, in the second sub-section (Sub-section 3.2.) we describe our case study and database. Then, in the next section, we evaluate the empirical results of the rough set analysis that enable us to compare *best practices* in European cities to develop relevant policy recommendations.

3.1. Rough set analysis

Our explanatory framework of the characteristics for urban green spaces management is based on a particular recently developed artificial intelligence method viz. *rough set analysis*. In recent years, the popularity of artificial intelligence techniques for the identification of underlying structures in complex databases has drastically risen. In our study, the data system on urban green spaces can be regarded as a mixed (qualitative and quantitative) database that is suitable for classification and explanation. This multidimensional classification approach appears to be able to identify various important factors that are responsible for successes and failures of urban green space policies.

Rough set analysis is a qualitative multivariate decision-analytical classification method that originates from the artificial intelligence literature. This method seeks for patterns among explanatory variables and a relevant ‘endogenous’ variable to be explained. It is based on mathematical concepts that deal with uncertainty. In the rough set model an upper and lower bound is defined, each of which has members and non-members respectively. Members of a boundary region are “possible members”. The classification rules are represented as “if...then” statements, with the aim to make the maximum reliable prediction for the assignment of a certain event to a given class.

Rough set data analysis (RSDA) is an application of Knowledge Discovery in Databases which is concerned with extracting useful information from a complex multivariate data base (Fayyad et al. 1996). Rough set data analysis is based on minimal model assumptions and admits ignorance when no proper conclusion can be drawn from the data at hand (Ziarco 1998). RSDA draws all its information from the a priori given data set. In other words, RSDA remains at the level of an empirical system: more formally, the numerical and the empirical system coincide and the scaling is the identity function. In RSDA, there is no numerical system that is different from the operationalisation of the observed data, and there are no outside parameters to be chosen, nor is there a statistical model to be fitted. RSDA can be viewed as a preprocessing device to recognize the potentially important explanatory variables. Data reduction is the main feature of RSDA, as it allows to represent hidden structures in the database. It should be stressed here that rule induction is not a part of rough set theory. It can rather be seen as a tool for preparing data for induction especially for defining classes for which rules are generated. The final outcome of the data base is a

decision table from which decision rules can be inferred by using rough set analysis. The rules are logical statements (if...then) which represent the relationship between the description of objects and their assignment to particular classes (see Pawlak 1991; 1992). Details on rough set analysis both from a methodological and from an applied perspective can be found in Degoun et al. 1997, Famili et al. 1997, Fayyad et al. 1996, Pawlak 1991, 1992, Slowinski 1995, van Delft et al. 2000, van den Bergh et al. 1998 and Ziarco 1998.

3.2. Description of case study and database

In this study, we aim to compare the “*green performance*” of European cities in terms of the priorities in decision-making and planning, and their success level from proper evaluation perspectives. The sample in our study contains European cities which aim to share their experience in innovative green space policies and strategies. The data and information used for comparison and evaluation are based on extensive questionnaires obtained from relevant departments or experts of municipalities in European cities.

For the application of the rough set analysis seven explanatory variables based on management and planning of urban green spaces were described to identify the green performance of cities from proper evaluation perspectives. Table 1 summarizes these variables. The definition for each variable in Table 1 and their data sources are given below.

A1.Proportion of green spaces per 1000 inhabitant (m^2): This data is obtained directly from the representatives of municipalities by questionnaires.

A2.Importance of green spaces to the city compared to other functions: With this question it is aimed to highlight the importance and the priority of urban green spaces in the city from the perspective of planning authorities. The importance of green spaces is defined in five categories; (1) very important, (2) important, (3) medium, (4) less important, (5) not important.

A3.Recent changes in the total area of green spaces in the last 10 years: This data is obtained directly from the representatives of municipalities by questionnaires. The changes are defined as an increase, a decrease or no change in the total area of green spaces in the last 10 years.

A4.Changes in the budget for greenery in the last two years: This data is obtained directly from the representatives of municipalities by questionnaires. The changes are defined as an increase, a decrease or no change in the budget for greenery in the last two years.

A5.Existence of special planning instruments for urban green: This information is obtained directly from the representatives of municipalities by questionnaires in terms of “yes” or “no”.

A6.Number of responsible departments for the planning of urban green: This information is obtained directly from the representatives of municipalities by questionnaires in terms of "only one department" or "more than one department".

A7.Experience with citizen participation: This information is obtained directly from the representatives of municipalities by questionnaires in terms of “yes” or “no”.

D1.Level of performance: With this question it is aimed to highlight the success level of urban green space policy in light of the objectives of a city from the representatives’ own evaluation perspectives. The performance is defined in five categories; (1) very successful, (2) moderately successful, (3) marginally successful, (4) low success, (5) no success at all.

4. Empirical results: Best practices in European cities

Table 1 Explanatory variables of management and planning of urban green spaces

Performance of Urban Green Space Policy in European Cities									
	Availability of green spaces	Importance of green spaces	Changes in green spaces	Budget for green spaces		Planning of green spaces			Success
	A1	A2	A3	A4	A5	A6	A7	A8	D1
Cities	Proportion of green spaces per 1000 inhabitant (m2)	Importance of green spaces to the city compared to other functions	Recent changes in the total area of green spaces in the last 10 years	Annual budget for urban green spaces related to the total budget of the city (%)	Changes in the budget for greenery in the last 2 years	Existence of special planning instruments for urban green	Number of responsible departments for the planning of urban green	Experience with citizens participation	Success level
Alphen aan den Rijn	57153		1	34	1	1	2	1	
Antwerp	51509	2	1	1,59	2	2	1	1	1
Berlin	37846	1	1	0.7	2	1	2	1	3
Bern	30510	2	1		2	1	1	1	2
Birmingham	20000	3	1	1.14	2	1	1	1	2
Budapest	61800	3	2	1	1	2	2	2	3
Cracovia	65455	3	2	-	1	1	2	1	3
Dublin	40000	2	3	3	1	1	2	1	2
Edinburgh	144592	2	2	-	2	1	2	1	3
Espoo	140000	2	1	1.3	1	1	1	1	2
Genoa	49394	2	1	1	3	2	2	2	3
Helsinki	102867	2	2	-	2	1	1	1	2
Istanbul	5000	1	1	16.6	1	2	2	1	1
Leipzig	93652	3	1	1.27	2	1	2	1	2
Ljubljana	25971	3	2	-	1	2	2	1	4
Lodz	65600	3		0.5	1	2	1	2	4
Malaga	7790	2	1	1	1	2	2	1	2
Marseilles	118225	1	1	1	1	2	1	2	1
Montpellier	33000	2	1	4	1	2	2	1	1
Salzburg	13440	2	2	1.3	2	1	2	1	2
Sarajevo	11000	2	2	7	1	2	2	1	3
Turin	19444	3	1	1	3	2	2	1	2
Vienna	125441.09	2	2	1	3	2	2	1	2
Warsaw	68499	2	2	0.79	1	1	2	1	2
Zurich	111919	2	2	0.01-0.03	1	1	1	1	1

A1- *Proportion of green spaces per 1000 inhabitant (m2)*

A2- *Importance of green spaces to the city compared to other functions:* (1) very important; (2) important; (3) medium; (4) less important; (5) not important

A3- *Recent changes in the total area of green spaces in the last 10 years:* (1) increase; (2) decrease; (3) no change

A4- *Annual budget for urban green spaces related to the total budget of the city (%)*

A5- *Changes in the budget for greenery in the last 2 years:* (1) increase; (2) decrease; (3) no change

A6- *Existence of special planning instruments for urban green:* (1) yes; (2) no

A7- *Number of responsible departments for the planning of urban green:* (1) only one department; (2) more than one department

A8- *Experience with citizens participation:* (1) yes; (2) no

D1- *Success level:* (1) very successful; (2) moderately successful; (3) marginally successful; (4) low success; (5) no success at all

5. Policy relevance for planning and management of urban green spaces

The problems observed in management and planning of urban green spaces make necessary to develop a new approach and new principles. *First*, to improve present practice an informative database and good practice networks should be created. *Second*, urban green and open space planning policies should be determined locally and these policies in development plans should aim at satisfying local needs and assisting in the achievement of national and international objectives. *Third*, more integrated approaches for the development and management of urban green spaces are needed. New approaches to combine strategic planning for green space with innovative design and the delivery and active involvement of the community at all stages should be developed. A collaborative and enabling partnership among local authorities, local businesses and voluntary groups should be formed. Community involvement including local residents and the specific users of the spaces should be provided. *Fourth*, planning authorities should develop their own local standards for green spaces not only in new housing developments but also in non-housing developments such as industry, and business. *Fifth*, quantity, quality and accessibility of green spaces should form the basis for a vision for urban green space. Planning policies should give a high priority to ensuring that new green spaces are of sustainable high quality, if necessary at the expense of quantity.

As a result, all research and policy efforts for improving the quality of life in cities and urban regions of Europe will have an impact on the quality of locations both on a small and a large scale. Providing attractive and accessible green spaces creates benefits to the competitiveness of the urban location in a broader perspective.

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