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SMART CITIES RANKING: AN EFFECTIVE INSTRUMENT FOR THE POSITIONING OF CITIES?

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Abstract

Due to different reasons cities are increasingly challenged to improve their competitiveness. Different strategic efforts are discussed in planning sciences, new approaches and instruments are elaborated and applied, steering the positioning of cities in a competitive urban world. As one specific consequence city rankings have experienced a remarkable boom. However, there is some evidence that public attention of city rankings is mainly concentrated simply on the ranks themselves totally neglecting its meaning as an instrument for strategic planning.

In order to elaborate this potential meaning of rankings the paper gives an overview of different types and introduces an own approach called 'Smart City ranking'. Based on this ranking approach and corresponding experiences of different cities reacting on its dissemination in the second part the paper shows how this approach can be used as an effective instrument detecting strengths and weaknesses and improving a city's competitiveness through relevant strategic efforts.

1. Introduction and background

Because of radical economic and technological changes cities are facing growing competition for investors, tourists, qualified labour or international events over the last decades (Begg 1999). Therefore, cities are challenged to introduce more strategic instruments in order to concentrate relevant organizational capacities and to identify most relevant strategic projects steering urban and metropolitan development in an effective and competitive way (Jessop et al. 2000; Maier, 2000).

As one of several consequences city rankings have experienced a remarkable boom: On the one hand the comparison of cities can support investors in their choice of location, on the other hand it can be an important guide for the cities to judge their strengths and weaknesses and to define their goals and strategies for future development and better positioning in the urban system. However, there is some evidence that the discussion of city rankings is mainly

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concentrated on the final ranks totally neglecting (1) the methods and indicators used (see Schönert 2003) resp. (2) its purpose and effectiveness for strategic planning aiming at the improvement of the position to be gained.

In front of this development, this paper concentrates first on the question what the basic characteristics of national and international city rankings are. Correspondingly, a selected number of city rankings are analyzed in order to identify different types of such rankings. Thereby, the number and features of the indicators used in these rankings as well as their methods of sequencing is described systematically. Based on this typology the potential benefits and limits of rankings are worked out.

In a next step an own ranking approach ("European Smart Cities")³ is described in order to show how a ranking approach can not only provide a city's ranking number but also its manifold characteristics as a base for strategic discussion. The hierarchical and flexible features of the Smart City approach are worked out; impacts of the validity of data sources are discussed critically. Nevertheless, we can show that the complexity of the ranking approach (hierarchical, the sample of indicators and cities) constitute the base for a comprehensive assessment of strengths and weaknesses which was acknowledged in specific reactions of several cities after the dissemination of first results.

In the last part of the paper, we concentrate on the question what competitiveness means and in which ways the Smart City approach may be used as an instrument for enhancing a city's territorial capital in the context of its competitiveness. Accordingly, different urban strategies for steering its territorial capital through corresponding processes of learning which are based on the Smart City results are shown. Answering these questions the paper concludes in recommendations for making city rankings a more significant and effective instrument for steering economic, social and spatial processes in cities.

2. Characteristics of rankings

As a consequence of strong economic and technological changes over the last decades cities and regions are facing growing competition for high ranked economic activities (see Begg 1999). On the urban level, cities aim at improving their competitiveness and their position in the European or national urban system. Since the European Integration process has diminished differences in economic, social and environmental standards⁴, cities have converged in their basic conditions for competition, which is increasingly scaled down from the national level to the level of cities and regions (see Storper 1995). This trend enhances the importance of specific local characteristics, which provide comparative advantages competing for increasingly footloose and mobile global enterprises, investors, tourists and capital. Facing this development, urban competitiveness and corresponding strategic approaches with specific goals and modified instruments have become important efforts of urban politics (Giffinger et al. 2003).

³ This ranking was elaborated and published by an international consortium headed by the University of Technology Vienna (Giffinger et al. 2007).

⁴ In particular the adoption of EU standards and norms in the accession countries has accelerated this trend (see Pichler-Milanovic 2005).

One of these instruments is the ranking approach which primarily get attention through politics and mass media. However, ranking approaches have already a long tradition and different forms of ranking approaches have been developed. Thus, we start with a definition of ranking approaches in order to concentrate on a specific group within a wide and heterogeneous spectrum of them. Based on this definition, a typology of ranking approaches is elaborated and, finally, the explanatory and comparative power of such approaches is described.

2.1 Typology of rankings

In principle, the concept of comparing cities by using certain criteria is a well known point of view in urban research ranging from the very first calculation of a rank size rule, to the theory of Christaller on the centrality of places and, currently, to the ongoing discussion on global cities. These concepts focus on an overall classification of cities (more recently based on network-oriented criteria), but in the content of this paper, the term “ranking” is used in a more precise way, as one is confronted with a very broad spectrum and conceptual confusion when examining the state-of-the-art on city rankings: many different terms like “city ranking”, “comparison of cities”, “benchmarking”, “city-scan” etc. can be found. Therefore, constitutive elements of a city ranking – as the term is used in this paper – are that at least two cities are included, the structuring of cities are in an ascending/descending order resp. arranged in a hierarchy and the use of a combination of at least two indicators for building up the order/hierarchy.

As indicated before, not much research has been conducted on the methodology of rankings and their importance for different actors or their impact on certain issues of city planning. However, Fertner et al. (2007) define three distinguishing aspects by which city rankings can be compared and classified:

- Objective: The objective of the ranking is not only specified by its aim and its target audience but also by its spatial scope and the desired factors and indicators behind the ranking.
- Methodology: Methodology does not only include the way of data collection and processing but in a first step also the limitation of cities examined in the ranking.
- Dissemination: The way how the results are evaluated, interpreted and presented is crucial for the impact of the ranking.

Based on these considerations, this paper deals with two specific research questions on the types of rankings: how can one differentiate types of rankings systematically? What are the key issues to distinguish several city rankings? To answer these questions, a multiple correspondence analysis has been applied on 20 different city rankings published between 2000 and 2009. These rankings have been analyzed along several dimensions. (see Fig. 1)

Table 1. Dimensions for analysis and creation of typology of city rankings⁵

Dimension	Analyzed indicator (examples)
Authorship and publication	Author(s) and sponsor(s) Type of publishing
Data base	Time scale of used data Published source of data and/or raw data available Method of calculation of overall-ranking
Use of indicators	Number of indicators Method of calculation Use of standardized values
Spatial dimension	Size of city sample Selection criteria for cities
Elaborateness of results	Overall-ranking; Results for selected topics and cities Results available for free/liable to pay costs

Source: Own elaboration.

By means of these dimensions, 5 types of city rankings can be identified by applying a multiple correspondence analysis⁶:

- 1) *Commissioned economy/consulting-oriented rankings with missing transparency and documentation* comprise quite many cities (scope: worldwide) without declaration of sample selection. These rankings apply a moderate number of indicators (median = 32) for calculation without documenting the indicators themselves nor the used data base, nor the method of calculation itself. The detailed results of the ranking are only partially available.
- 2) *Commissioned rankings with insufficient transparency created by expert panels or other private research institutes* work on varied spatial dimension and include many cities (median = 75) without making the city sample selection procedure really apparent. The used data base is not clearly documented either, although some of the original data is published within the quite detailed results (overall ranking, results on sub-rankings, etc.). A list of indicators (median = 43) is published, but the rankings do rarely provide information on the calculation method. Sponsors of these rankings are financial institutions, magazines or real estate agencies.
- 3) *Rankings compiled by magazines or NGO's without sponsoring* are usually created for one specific country or a whole continent by taking into account a comparatively low number of cities (median = 25). The selection of the city sample is conducted by population size and the calculation of the overall-ranking is done by average values. There is no consideration of missing values within the used data base, but the data

⁵ Furthermore, some additional dimensions have been collected, such as date of publishing, types of indicators, objectives of rankings etc. These dimensions have not been considered for compiling the typology of rankings.

⁶ Model: N = 20 / Cronbachs Alpha (average value) = 0,944. Multiple correspondence analysis arranges objects or data measurements according to their similarity/dissimilarity along certain dimensions (see Blasius 2001).

base is made transparent for each indicator. The documentation of the method used for the ranking is fair; however, the results are available in a very detailed way.

- 4) *Well-documented and methodically advanced rankings conducted by universities or economic research institutes with sponsors in different areas* (financial institutions, magazines, real estate agencies etc.) mainly focus on one country or one continent. The selection criteria for the city sample are either population size or a combination of different characteristics. All parts of the ranking are made transparent (entire list of indicators available, description of calculation method etc.) and the method used for calculation of the ranking is usually more advanced than those used within the other types of rankings described above (e.g. use of standardized values, consideration of missing values etc.). The data base is documented for each indicator and original data is published to some extent. The elaborateness of results is pretty well, too, focusing more on the overall-ranking and on methodological details than on the description of single cities or on thematic “Top10-Evaluation”.
- 5) *Special cases* (outliers; 2 rankings) cannot be allocated to one of the four above described types of city rankings.

The table given below shows the most important characteristics of the four different types of city rankings. Type 5 comprises only two outliers and is not discussed below:

Table 2. **Characteristics of typology**

	Type 1	Type 2	Type 3	Type 4
Number of rankings	3	3	4	8
Transparency of ranking calculation	very bad	bad	good	very good
Documentation of data base	very bad	bad	very good	very good
Number of indicators ⁷	32	43	51	29
Spatial dimension	worldwide	varying	country / continent	country / continent
Number of cities ⁸	60	75	25	54
Transparency of city-sample selection	very bad	bad	very good	very good
Elaborateness of results ⁹	2,17	2,67	2,75	2,62

Source: Own elaboration.

⁷ Median.

⁸ Median.

⁹ Average index value (“elaborateness-index” of ranging from 1 (results only documented by overall-ranking) to 4 (results documented by overall-ranking, sub-rankings, results on selected cities and results on thematic “Top10-evaluation”).

2.2 *Benefits and limits of city rankings*

Based on that typology we can further on deal with the question, whether and how the results of rankings can be applied in strategic policy advice for cities. Linked to the findings presented in table 2, one can point out the following explanatory and comparative power of city-rankings for steering urban competitive development:

Benefits and potentials

Obviously, rankings attract attention in general and call attention to issues of regional science in particular. In addition to that, the release of a new ranking often stimulates a broad discussion on regional development strategies, as Schönert has shown within a study for 20 German cities (Schönert 2003). More generally considered, one can state that theatricality and production/stating of (mass-media oriented) policy gain more and more importance (not only caused by media, but also supported by the self-promotion of cities and promotion of policies by politicians themselves; see Meyer/ Schicha/Brosda 2001). Therefore, rankings can be applied to issues of city marketing or other relevant policy areas (rankings as “flagships”) – especially rankings of type 1 (as mentioned before) seem to be tied up to this idea, as these rankings specifically target (mass) media and often work on a consulting-oriented basis.

Further potential capacity of rankings follows from the fact that they are a competitive instrument and that positive characteristics are made public outside the city itself with the help of city rankings (Fertner et al. 2007). Cities are enabled to find their position within the ongoing urban competition and to focus their profile. Furthermore, city rankings may initiate learning effects as regional actors are forced to make their decisions transparent and comprehensible, but, however, this transparency is only guaranteed with rankings of type 4 (to a lesser extent also within type 3).

Finally, rankings focusing on a clearly defined issue provide more applicable results than rankings providing ‘just’ an overall list. For example, rankings of type 3 (mainly conducted by NGOs without sponsoring) have a very clear focus, which is reflected by a high elaborateness-score. Likewise, also rankings of type 2 show up with a certain focus represented by the particular expert panels creating the ranking (expert panels are composed according to the intention of the city ranking).

Limits and risks

The first part of limits of city rankings can be subsumed as the problems of “beauty contest” and “recursive self-affirmation” (Schönert 2003): the discussion on ranking results very often focuses on final ranks and, consequentially, complex interrelations and causalities are unattended or neglected. Public attention is mainly focused on the final ranking without considering the methodological aspects behind the ratings, which can be observed in the conception of many rankings. Except for the rankings of type 4 (and so a smaller extent also type 3), the methodology of the respective ranking is only considered within a little notice or as footnote. The combination of a very selective public perception of rankings results and the selective city sampling within rankings enforces a confirmation of existing stereotypes and clichés. Moreover, this problem of boosting stereotypes is probably worsened if the method of city sample selection is not made transparent (as done in rankings of type 1 und type 2).

Considered from a more strategic point of view, city rankings may threaten long-term development strategies as rankings strengthen competition between cities, which may have negative consequences like deregulation, structural and spatial problems, risk for socially acceptable city development etc. Furthermore, the non-reflected handling of ranking results is counterproductive for balanced city development strategies as rankings are excessively acclaimed by the “winners” and ignored by the “losers” (Fertner et al. 2007). Moreover, cities (mainly badly ranked cities) oppose comparisons with others (“benchmarking”) in general (Schönert 2003) and, in addition to that, rankings tend to follow a “generalistic” approach, as many financiers ask for clear results which can easily be communicated in public and so most rankings aim at finding the “best” or “most attractive” city in general terms totally ignoring the fact that different activities need different conditions. This non-deliberate point of view is encouraged mainly by rankings of type 1 and type 2, or, the other way round, produces rankings of these two types rather than more (methodologically) advanced city rankings.

3. European Smart Cities – Ranking: basic features, forms of results and experiences

The European Smart Cities - Ranking approach was developed according to the following objectives:

- (1) transparent ranking of a selected group of cities
- (2) elaboration and illustration of specific characteristics and profiles of every city
- (3) the encouraging of benchmarking between selected cities
- (4) identification of strengths and weaknesses for strategic discussion and policy advice.

This ranking approach has been published in 2007 (Giffinger, et al., 2007) and explicitly deals with medium sized cities in Europe, taking into account their perspectives and challenges of development. Basically, medium-sized cities, which have to cope with competition of the larger metropolises on corresponding issues, appear to be less well equipped in terms of critical mass, resources and organizing capacity. Even though the vast majority of the urban population lives in such cities, the main focus of urban research concentrated up-to-now on ‘global’ metropolises neglecting the importance and specific challenges of medium sized cities in the European context. Due to these specific objectives and basic considerations the Smart City approach finally shows the characteristics of type 4 of the above described typology, showing up with a quite high number of included cities, a transparent method of calculation and detailed results, as described in the following.

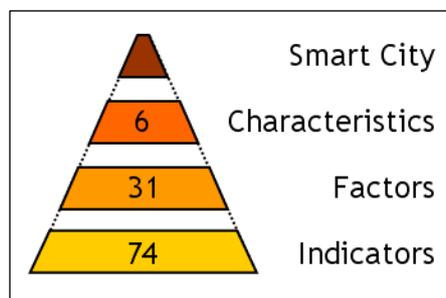
3.1 Characteristics of the Ranking approach

In order to implement this approach “smart city” was defined – based on round table discussion and literature research – as follows: “A Smart City is a city well performing in six characteristics, built on the ‘smart’ combination of endowments and activities of self-decisive, independent and aware citizens.” (<http://www.smart-cities.eu/model.html>; found on 18th of June, 2008). However, the term ‘smart city’ is not used in a holistic way but in most examples one emphasizes specific characteristics of different fields of urban development and even the awareness and participation of a city’s inhabitants regarding special issues of urban development. Accordingly,

‘smart’ implies the implicit or explicit ambition and intention to improve its performance regarding urban development in the specific characteristics.

According to literature and a round-table-discussion, six ‘smart’ characteristics had been identified which are likely to be relevant: economy, people, governance, mobility, environment and living. These six characteristics were regarded as the relevant group characterizing a smart city. They can be broken down into 31 relevant factors (see list of factors in figure 2) which reflect the most important aspects of every smart characteristic. Finally, every factor of a smart characteristic has been defined empirically through a group of corresponding indicators. In total, 74 indicators were defined and used for operationalizing and aggregating the relevant factors (in total 31 factors for the ranking procedure as shown in figure 1).

Figure 1. Description of Smart City

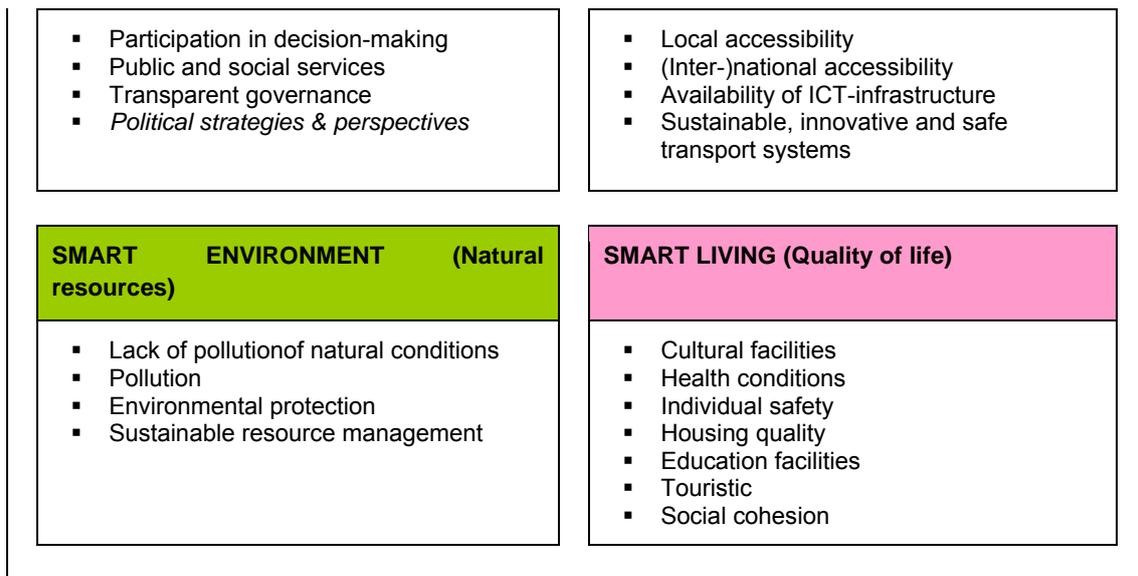


Source: Own elaboration.

To give an example: ‘Smart people’ as characteristic is defined through the 7 factors mentioned below in figure 2; for instance, the factor ‘affinity to lifelong learning’ is then operationalized through the indicators ‘Book loans per resident’, ‘Participation in life-long-learning in %’ and ‘Participation in language courses’.

Figure 2. List of characteristics and factors

SMART ECONOMY (Competitiveness)	SMART PEOPLE (Social and Human Capital)
<ul style="list-style-type: none"> ▪ Innovative spirit ▪ Entrepreneurship ▪ Economic image & trademarks ▪ Productivity ▪ Flexibility of labour market ▪ International embeddedness ▪ <i>Ability to transform</i> 	<ul style="list-style-type: none"> ▪ Level of qualification ▪ Affinity to lifelong learning ▪ Social and ethnic plurality ▪ Flexibility ▪ Creativity ▪ Cosmopolitanism/Open-mindedness ▪ Participation in public life
SMART GOVERNANCE (Participation)	SMART MOBILITY (Transport and ICT)



Source: Own elaboration.

All 74 indicators which are finally used in the ranking obtained from the following data sources: Urban Audit (local, core), ESPON 1.4.3 project (FUA level), ESPON 1.2.1 project (NUTS 3), Eurostat database (NUTS 3, NUTS 2 or NUTS 0), various Eurobarometer special surveys and a study (Ministère de la culture, 2005) on creative industries (NUTS 0). Of course, the majority of all indicators (65%) are defined at the local level. Others which are derived from data on the national or NUTS 2 level are included because they provide additional information not only about the endowment of cities but also about the perception and assessment of specific developments.

In a second step questions regarding the selection criteria of cities as well as the aggregation procedure were dealt with from a methodological point of view: In order to make the ranking approach more transparent, the definition of the city sample is essential. In comparison to other ranking approaches the Smart-City approach considers only medium sized cities in Europe. As there is no clear and common definition of medium sized cities, we defined four criteria for selection:

- Potential members are all functional urban areas in Europe (FUA): these are about 1.600 entities in Europe according to the findings in the ESPON 1.1.1 study including all 27 EU-member states as well as Norway and Switzerland. (Nordregio, 2004)
- Within this group 584 core-cities with a population between 100.000 and 500.000 inhabitants were selected because they represent medium-sized cities and non-capital cities for most countries. The only exception is Ljubljana in Slovenia.
- Within this group only such 364 cities were selected which had at least one university which indicates a precondition for knowledge based and smart urban development:
- Finally, the last selection criterion of the remaining cities was a catchment area of less than 1.5 million inhabitants assuming that such 256 cities were not part of a metropolitan agglomeration.

So, 256 medium sized cities remain for a potentially ranked group. Due to accessibility and quality of data this number is reduced to 70 cities. Besides, a small number of these cities are considered although they have a slightly larger catchment area. Of course, any reduction or addition of a city in the ranking approach will affect the results in a marginal way. However, the definition of this group of 70 cities finally guarantees that they provide valid and comparable information. The city sample (and the grouped ranking of cities as the most aggregated result) is shown in figure 3.

The aggregation procedure for defining the Smart-City ranking is the following: The above described indicators are defined in different ways and, thus, they show completely different levels of values and different ranges which are not allowed to be merged in any form. Therefore, these indicators are standardized through a z-transformation resulting in a distribution with an average value '0' and a standard deviation of '1'. Through this transformation indicators are now comparable and appropriate for any aggregation procedure. Assuming the interchangeability of indicators defining a factor all (not missing) values are added up to the aggregated value for every factor resp. for every characteristic and in total for every city itself. As some cities show missing data which does not allow calculating the (standardized) indicator value, we finally do not use the sum of all values but the average value of the aggregated values divided through the case-specific number of values. Finally, assuming that there is no difference in the importance of distinct fields of smart urban development, all indicators, factors and characteristics remain non-weighted in the aggregation procedure.

Figure 3. **City sample and group rating (Source: Giffinger et al. 2007)**
The darker the color the better the rating



Source: Own elaboration.

However, two aspects of using the above mentioned data sources in our approach should be mentioned critically:

- First, the Urban Audit data provide information about a wide range of different and important fields of urban development and living quality. Despite the efforts of this initiative in collecting valid and reliable data on the European level one should be aware of the basic problem of their comparability. This aspect of comparability is the more important and problematic the more social and economic issues (i.e., health care system) on the national level differ across European member states. Consequently, same or similar definitions of variables probably do not describe the same and comparable issues.
- Second, the use of data sources which offer information at the level of national states (Eurobarometer), have a strong restrictive impact on the analytical power of the Smart City approach: Due to this fact, groups of cities which belong to one of the member states show same indicator values – independent of a city's individual situation. However, comparability is at least possible between (groups of) cities between member states.

3.2 *Different forms of results*

Based on these definitions and methods smart cities are ranked according to their average value across all indicators. Usually, this information on the rank of a city is highly recognized and discussed in public media. Whereas the rank itself does not provide specific and valuable information for policy advice, the geographic distribution of ranked cities seems to be very interesting under the perspective of comparable smart cities on the interregional, national and European level. For an overview of the cities and their grouped ranking see fig. 3

Besides the ranking results empirically detailed findings are produced and illustrated via tables, graphs and maps. According to the aggregation procedure every city shows a value for its smartness. In addition, for every city the profile regarding the six characteristics is displayed and indicates a relative heterogeneity in the city-specific bundles of characteristics at a first glance.

Of course, ranking approaches and their findings will have more public attention the more dissemination of relevant results is encouraged. As relevant empirical results which are disseminated through a corresponding homepage (<http://www.smart-cities.eu/>) we provide most relevant information about:

- the whole sample in order to show the position of distinct cities within the group or relative to other cities (benchmarking)
- selected single cities in order to illustrate its specific profile of characteristics and corresponding factors.

Figure 4 shows the final ranking with cities of position 1 to 10. Of course, the homepage not only provides the total ranking but also the specific ranking in one of the six characteristics in an interactive way.

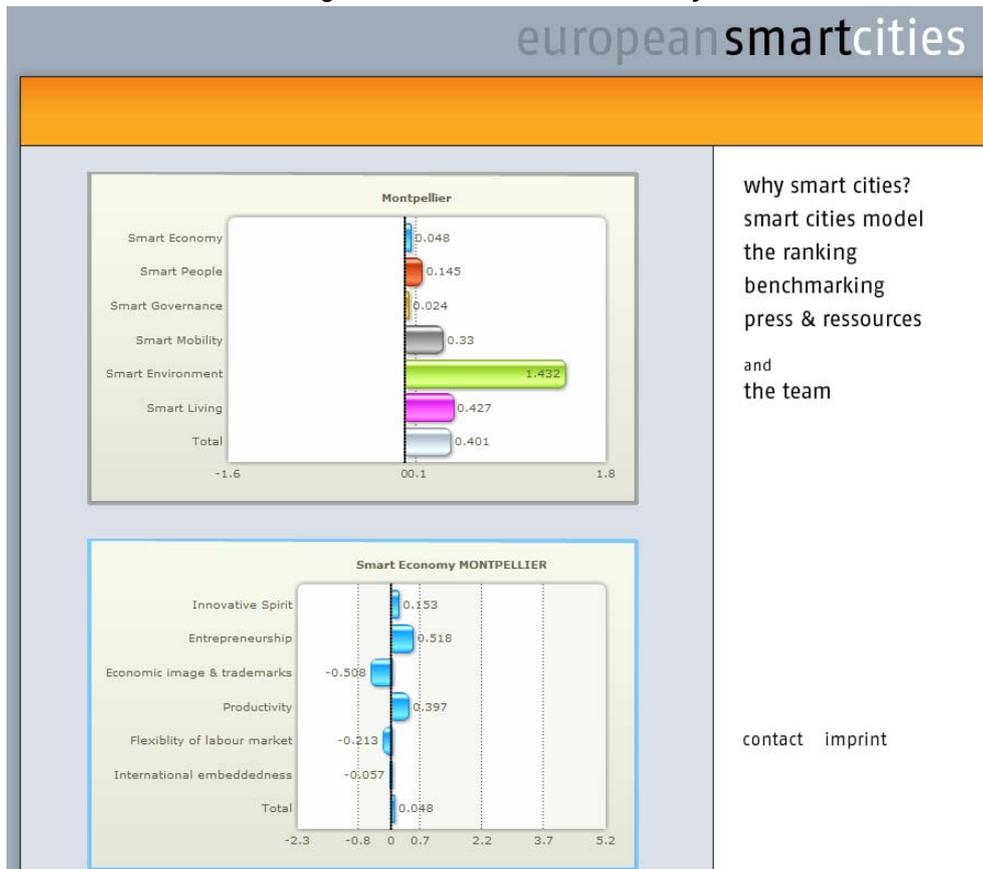
Figure 4. Smart Cities ranking results



Source: Own elaboration.

Finally, figure 5 shows the profile of a city's aggregated smart characteristics in total as well as the profile of every characteristic defined by its smart factors (i.e, factors of smart economy).

Figure 5. Profiles of a Smart City



Source: Own elaboration.

In particular, figure 5 resp. the profiles of characteristics and factors already show the descriptive power and strategic potential which the approach provides. These forms of findings raise on the one hand the possibility for benchmarking with other cities. On the other hand, such findings could be analyzed in more detail on the level of 74 indicators. For instance, the negative value (compared to the average value of all European smart cities) of 'international embeddedness' It is possible to discuss in its three dimensions according to the constituting indicators 'companies with headquarter in the city quoted on national stock market', 'air transport of passengers' and 'air transport of freight'.

3.3 *Impacts of dissemination*

Results have been disseminated through two activities: (1) a press conference was organized at the international fair EXPO REAL in Munich, Germany, in 2007; (2) an own site in the internet was issued (<http://www.smart-cities.eu/>) which is still online.

The press conference provoked attention and provided the dissemination of the results by international press. Newspapers in different European countries (Germany, Finland, Luxembourg, Slovenia and Austria) reported about the Smart City ranking results. At least same importance for dissemination had the presentation of the webpage during the press conference. This webpage provides more information about the approach and the model, the ranking of all cities in total resp. due to distinct characteristics and, finally, allows the benchmarking for distinct cities illustrating corresponding results.

As expected these forms of dissemination provoked positive reactions basically confirming our results mostly under the aspect of benchmarking. Besides, some cities reported and discussed the ranking on city-specific websites and took the detailed information for discussion of recent urban issues. Even not so well ranked cities made a statement on that results and agreed with their ranking due to the detailed and transparent approach.

More important: some cities decided to take up this findings for official policy issues; for instance Turku (see: http://www.utu.fi/en/research/researchs_turku/turku_was_ranked_high_in_the_ranking_of_european_middle-sized_cities.html; seen 19.8.2008); and, some cities decided to become object of the ranking although they had not been selected according to our criteria resp. they want to be partner in a more exclusive network of smart cities which could provide more detailed information in order to bring forward their city development strategy.

Finally, some cities (in Austria, South England or in Central European states) asked for a specific policy advice and proposals on strategic efforts based on the Smart City approach. In order to do such recommendations one has to answer the question what significance rankings may have for the strengthening of urban competitiveness in a learning process.

4. Rankings in the context of urban competitiveness

Rankings are increasingly applied and used for a simple but in public discussion very effective benchmarking and branding of cities. The observed reactions of stakeholders in most cases do not have a profound and sustainable effect on cities which are object of this ranking – independently of their rank and success. However, according to our experiences there are specific possibilities to use the results of ranking approaches in a more effective way for the improvement of a city's competitive situation, but first one has to clarify what does urban competitiveness mean and how competitiveness is determined through its territorial capital.

4.1 *Territorial capital as the base for urban competitiveness*

In a more complex perspective, competitiveness considers urban development not only in economic terms but also in terms of living quality and socio-spatial cohesion on the urban-regional level (Begg, 1999, Giffinger, et al., 2003). This means that a city which is competitive against others is able to increase its economic performance and wealth whereas other social and environmental factors of urban quality will not be endangered through economic development. Accordingly, urban development (economic and demographic growth) is regarded as the outcome of a comprehensive understanding of competitiveness influenced by a variety of relevant factors in the economic social, demographic, environmental and cultural sphere.

The explanation of competitiveness is subject of academic discussion for many years. (i.e., Parkinson, 2003; or Begg, 1999). Since some years there is an increasing discussion on the relevance of territorial capital as the base for urban competitiveness. According to OECD (2001, p.13) it "refers to the stock of assets which form the basis for endogenous development in each city and region, as well as to the institutions, modes of decision-making and professional skills to make best use of those assets." In a clear analytical perspective Camagni (2007: 4ff) elaborated a simple taxonomy of components of territorial capital defined by two dimensions: one dimension represents the materiality; the other dimension represents the degree of rivalry. Every dimension is divided into three categories of materiality resp. rivalry providing in combination a matrix of nine elements. Based on these elements, the matrix finally distinguishes between tangible, mixed and intangible goods and private goods, club goods (impure public goods) and public goods which in sum define the territorial capital. Discussing these nine different elements and their importance for urban and regional development Camagni identifies the 'traditional square' and the 'innovative cross' of corresponding goods.

This 'innovative cross' in particular indicates that networks and regional governance approaches in form of networks of private, semi-public and public partners as well as relational capital in form of the cooperative capacity in an urban agglomeration are crucial in importance. They are the driving forces to activate endogenous potentials through corresponding initiatives. Explicitly, they aim at the enhancement of existing territorial capital in form of specific intangible assets. This means from a strategic point of view that the creation of assets – in particular of intangible assets - becomes the most important driving force of urban-regional competitiveness because they provide absolute and relative advantages of territories.

From a cognitive perspective, learning processes will have a decisive impact on the enhancement of territorial capital over time: The more such initiatives are based on experiences and learning processes, the more precise should be the identification of endogenous potentials as well as the assessment of strengths and weaknesses. Therefore, learning processes will provide the knowledge base for strategic efforts aiming at the improvement of relevant advantages for certain economic activities which make every city more competitive. Thus, territorial capital will be enhanced in an efficient way only if cooperative initiatives are the outcome of such learning processes regarding the existing strengths and weaknesses of a given urban situation. Consequently, over time a process of accumulation or depreciation may take place the more corresponding cooperative initiatives will strengthen or weaken the competitiveness of the metropolis in a decisive way.

4.2 Ranking approach as instrument enhancing territorial capital

As cities face growing competition and fast changing conditions of urban development, the enhancement of territorial capital through learning processes becomes important. Thus, learning processes should be an integrative part of any strategic planning approach.

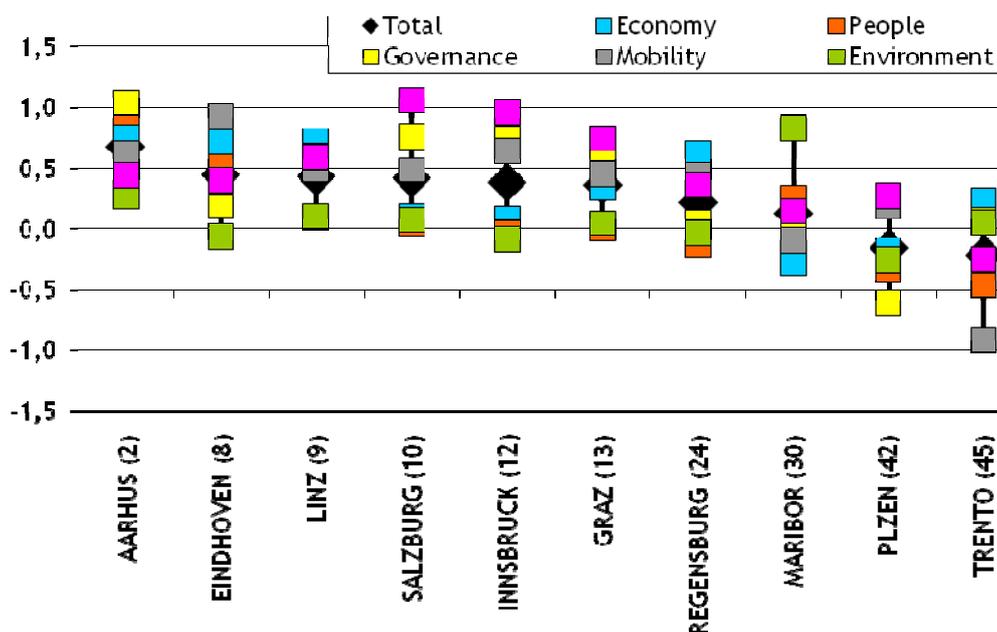
In this context the question raises how the Smart City approach can be used as an instrument for a learning process which makes strategic planning efforts more effective in strengthening a city's competitiveness. Two examples are examined:

First, lesson drawing approaches concentrate on the understanding of conditions under which policies operate in lending political systems and on creating proper conditions in borrowing political systems (Page, 2000). Applying this approach raises different questions: One important question is from where experiences can and should be transferred (Robertson, 1991; Robertson and Waltham, 1992). Local governmental levels are likely to look to nearby local governments, assuming that they have most in common with neighbors. In this sense, subjective identification and political values are important in directing the search. Ideological compatibility, similarities in resources, psychological or cultural proximity, the availability of evidence and interdependence are other factors to be considered (Rose, 2001) when selecting cities from which a lesson can effectively be drawn.

Second, evidence based approaches need a detailed description and analysis of the relevant fields of urban development. In order to elaborate a comprehensive and effective strategy an assessment of strengths and weaknesses is one of the preconditions meeting recent challenges of a city's competitiveness. The Smart City approach allows such an analysis in a rather differentiated way on the levels of 6 characteristics, 31 factors and 74 specific indicators. Especially on the more disaggregated levels, empirical analysis can focus (1) on strengths and weaknesses of any city in comparison to average values of all cities on the European level, (2) on strengths and weaknesses of any city in comparison to any other city of the sample as well as (3) on interrelated issues based on a functional understanding of urban development. So, the Smart City approach provides sufficient evidence for discussing the smartness (i.e., well performing) of a city and produces comprehensive evidence in order to identify important challenges for new strategic efforts. For example, figure 6 shows the profiles of characteristics of a selected group of Central European cities with special focus on Austrian (and nearby) cities. Very obvious, the profiles show many differences between the 6 characteristics, although

the final ranks do not necessarily differ very much, e.g. Plzen (ranked 42) and Trento (ranked 45) seem to be quite similar when looking at their final rank solely. But, in detail, Plzen shows quite a good performance in “Smart Living” and “Smart Mobility” in combination with a rather low rating on “Smart Governance”, “Smart People”, “Smart Environment” and “Smart Economy”; while Trento has a quite good activity in “Smart Economy” as well as in “Smart Environment” and – contrary to Plzen – a need for improvement within the areas of “Smart Mobility”, “Smart People” and “Smart Living”.

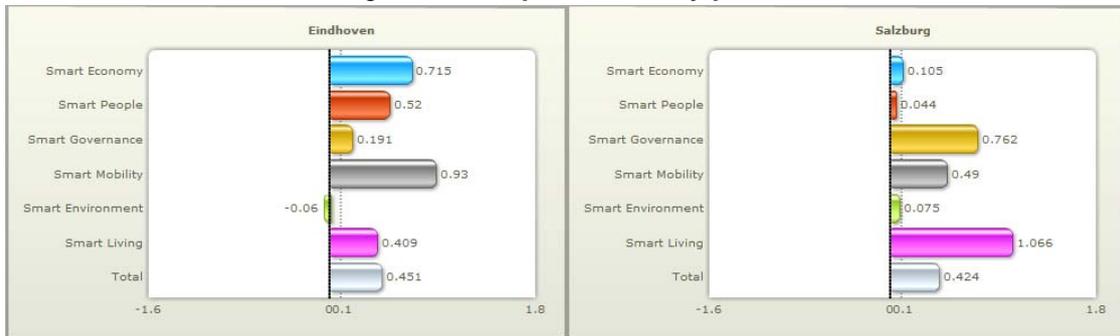
Figure 6. Characteristics of selected European cities



Source: Own elaboration.

Another example for a detailed analysis within the Smart City approach can be demonstrated by comparing Innsbruck (ranked 12) and Graz (ranked 13), two Austrian cities: both show a similar rank and also quite similar characteristics (e.g. both are doing well in “Smart Living” and “Smart Governance”; not so well in “Smart Environment” and “Smart People”), but on closer examination Innsbruck shows up with a much broader spectrum within its city profile, while the characteristics of Graz are arranged much closer to the average values of European Smart Cities (see figure 6). Furthermore, cities can be simply benchmarked according to their profiles (see showcase in figure 7), by the comparing their specific conditions (e.g. Eindhoven performs definitively better in “Smart Economy” than Salzburg, while Salzburg shows superior values in “Smart Living”) and even more differences can be analyzed at the detailed level of factors and indicators.

Figure 7. Comparison of city profiles



Source: Own elaboration.

Summing it up, the Smart City approach supports the exploratory benchmarking between any cities of the whole sample. This feature easily allows identifying specific cities which are very similar in its profile or which indicate good practices for learning due to their smartness in the one or other characteristic. However, the exploratory power or even its comparative power is increased when the profiles are based on factors instead of aggregated characteristics.

5. Perspectives of smart ranking as an instrument enhancing territorial capital

Obviously, the positioning of a city within the urban system is the result of a complex interplay of economic, geographic and socio-cultural conditions, which are partly locally determined. But at the same time, a city's position is strongly influenced by its strategic efforts as a specific aspect of urban governance. In our opinion the comparison and ranking of cities can be one important instrument in order to identify a city's comparative advantages and to enhance its territorial capital.

Due to the purpose of this paper the definition of the term "ranking" is quite restricted (as discussed in chapter 2.1), but for certain issues a more broad understanding of "city ranking" could be useful, for example to distinguish all kinds of ranking methods for cities according to the following dimensions:

- explorative vs. evaluative
- network-based vs. hierarchy-based
- target-group oriented (or specified on one single topic) vs. overall rankings

However, the analysis of different rankings according to their methodology and qualities as an instrument for comparing cities showed that rankings can be differentiated along certain dimensions resulting in their specific ability for application. On the one hand, there are rankings operating on a very broad spectrum of a great number of cities by mainly addressing the media and targeting on the image or the specific premises of cities for certain target groups. Unfortunately, these rankings show up with a very badly documented methodology and nontransparent results. On the other hand, rankings with well documented and quite elaborated calculation methods tend to address a rather small scientific community more than satisfying the demand by the public for easy (and uncritical) handling of rankings results. Concluding, the

ranking of cities can support investors in their choice of location on the one hand, but it can also be an important guide for future city development on the other. As rankings reveal particular strengths and weaknesses of the cities, policy makers are enabled to set specific actions to work on certain problems and to implement measures for sustainable development when considering the results of a high-quality ranking or benchmarking (as shown in the typology of rankings, only a smaller number of rankings show up with an elaborated and transparent methodology). In addition to that, positive results in a widely published and approved city-ranking can also be used as a central part of a city's marketing strategy: a top-rank in a highly reputed city-ranking definitely helps to improve the international image of a city (see Schönert 2003, Fertner et al 2007). Thus, city-rankings obviously can provide an important empirical base for disclosing comparative advantages and sharpening specific profiles and consequently for defining goals and strategies for future development. Besides, medium-sized cities have to cope with competition from the larger metropolises on corresponding issues, but appear less equipped in terms of critical mass, resources and often also institutional and organizing capacity. Hence, medium-sized cities may experience disadvantages because of a lack of size. Nevertheless, medium-sized cities may offer specific assets not available in larger cities.

However, which specific recommendations should be considered when applying a ranking approach as basic instrument to improve strategic efforts of medium-sized cities?

A comprehensive ranking approach - like the Smart City ranking - allows not only the ranking of cities but the detection of its profile with its strengths and weaknesses. The attractiveness and utility of such an approach will increase the more clear/similar are the criteria for the selection of cities and the more valid and reliable are corresponding indicators. Thus, a small and homogenous group of cities provide a better knowledge base for benchmarking and functional assessments. Convincingly, ranking approaches which fulfill characteristics of type 3 and 4 support the discussion on strategic efforts easily and in a productive way. As our experiences show, the dissemination of the Smart City results provoked public attention and a specific discussion on analytical issues and strategic efforts. Because of the relative large number of cities and the use of public data sources, the comparability and validity of some indicators is problematic but its modification depends on more accurate information from data sources at the European level.

Finally, what is the benefit of a ranking approach – like the Smart Cities - Approach – as a strategic instrument for enhancing the territorial capital of cities and setting up strategic policies?

After analyzing the advantages and disadvantages of the Smart Cities - Ranking approach for to enhance the territorial capital of cities, one can state that the advantages of this rankings procedure are the easy way for benchmarking and detecting strengths and weaknesses. The Smart Cities-Ranking analyses a wide range of factors which itself are defined by comprehensive bundles of indicators. Furthermore, besides the simple ranking, the hierarchical approach allows the identification of profiles on different levels in a comprehensive way which are very valuable in evidence based strategies. Anyhow, it remains a quantitative approach concentrating on issues which are measurable. At the same time this approach provides very specific and important information regarding the question of 'good practice'. It is easy to identify cities with interesting and specific profiles which may turn out to be 'good practice' examples.

To sum up, we made different experiences elaborating this approach and using it for individual discussion of several cities. Its usability for the elaboration of strategic efforts and policy advice is given but has to be enhanced through further research and revision. However, the

perspective that URBAN AUDIT provides new and recent data offers new opportunities for its inclusion into the Smart Cities approach providing then the possibility to compare specific characteristics and factors of urban development in a direct way on an ongoing basis or in a comparative way across other cities and across time.

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