

Herold, N.¹ and Herold, D.M.²

International Smart City Indexes: Emerging Trends and Metrics in City Competitiveness

Southern Cross University¹, 4225 Coolangatta, Australia

Griffith University², 4222 Southport, Australia

E-mail: natalie.herold@scu.edu.au

Extended abstract: There is a myriad of indexes and rankings outlining the comparative performance of cities all over the world. Based on a preliminary selection of seven indexes, the aim of this review is to investigate how the economic performance of cities can be measured and which indicators or categories of indicators are used to do so. Particular attention was given to indexes relating to city competitiveness and liveability.

I. INTRODUCTION

There is a myriad of indexes and rankings outlining the comparative performance of cities all over the world. One of the few things they have in common is that they are different: They differ with regard to their purpose, scope, thematic focus, the metrics used and consequently the results. Based on a preliminary selection of indexes, the aim of this review is to investigate how the economic performance of cities can be measured and which indicators or categories of indicators are used to do so.

In general, three types of city indexes and rankings could be identified, based on distinct features of authorship, covered regions and thematic focus. With regard to authorship, we can distinguish indexes, which are published by

- government departments (e.g. Department of Infrastructure and Transport 2013 [1]) or international organizations (e.g. European Commission & Eurostat [2])
- scholars (e.g. Lambiri, Biagi, and Royuela 2007 [15]; Florida 2002 [17]; Sufian 1993 [18] and
- commercial actors (e.g. consultancies, magazines). It is also important to note that there are two different types of indexes published by the latter group. These can be categorised as “for profit”, if the ranking is a part of the company’s product portfolio (e.g. Mercer 2012 [3]; EIU 2008 [4]) or “not-for-profit” if the publication is publicly available and free of charge (EIU 2012 [5]; MasterCard 2008; 2007 [6], [7]).

Another possibility to categorise city indexes is by regions. Some rankings compare

- cities worldwide (international focus, e.g. EIU 2012 [5]; AT Kearney 2012 [8]),
- cities in a certain region (regional focus, e.g. European Commission & Eurostat [2]) or
- cities in one country (national focus, e.g. Department of Infrastructure and Transport 2013 [1])

Finally, city indexes can be categorised by their main thematic focus. Here, the possibilities are virtually

endless. Cities can be ranked with regard to their performance as “green” cities [9], as emerging markets [8], as travel and tourist hotspots [10], or even as the best place to raise children [11].

II. OVERVIEW OF ANALYSED CITY INDEXES AND THE RESPECTIVE METRICS

Prior to the analysis of the indexes and their indicators, the logic behind the metrics and the way they are organised shall briefly be discussed. Every index defines a set of indicators. These indicators are in turn grouped into categories of indicators. Sometimes sub-indicators are used to specify the indicators more precisely. In the EU Urban Audit [2] for instance, “total population of working age” and “proportion of population aged over 65” are used as a sub-indicator to further define the indicator “population”, which together with “nationality” and “household structure” forms the “demography”-category of the index.

In order to explore the metrics used in the different indexes and identify common themes, each index was analysed with regard to its indicators. Furthermore, the way in which indicators are grouped in categories was examined. This has been performed for:

- four indexes measuring city competitiveness and
- three indexes measuring liveability

III. CITY COMPETITIVENESS FOCUS INDICATORS

Economic performance, financial flows, institutional effectiveness, human capital, global appeal as business and political centre and social and cultural character could be identified as common themes with regard to indicators used in all four analysed indexes. Apart from these main categories, further indicators referring to physical capital and infrastructure (e.g. road networks, public transport), information exchange (e.g. broadband access) as well as environmental and natural hazards (e.g. risk of natural disasters) were found as further categories in one of the indexes studied [5].

IV. CRITICAL ISSUES WITH REGARD TO INDEXES AND METRICS

The review of the indexes revealed some critical issues to be borne in mind with regard to city indexes and city rankings. However, these issues shall not be regarded as the only possible conclusion, which can be drawn based on the presented review. Rather the aim is to identify critical issues, which could be worth further academic or professional examination. Most importantly, however, these issues are meant to nurture a discussion with regard

to city indexes in general and ways of measuring city competitiveness in particular.

A. Definition and Choice of Cities

Most indexes provide no clear definition of a city and no explanation why the respective cities were included in the ranking at all. This may be influenced by the fact that most of the analysed indexes were published by commercial actors like the Economist [4], [5], MasterCard [6], [7] or Mercer [3]. Regardless of the nature and purpose— as part of the company’s product portfolio or freely available – these reports primarily focus on the concise presentation of the main results and only reveal limited (if any) details about the methodology used.

In general, the few references that can be found with regard to the choice of the analysed cities refer to population size, and the economic or political importance of the city [1], [2], [5].

B. Validity and Reliability of Indexes

Another critical issue refers to the validity and reliability of the indicators. An important question in this context is whether the indicators chosen really allow for conclusions with regard to the features they are supposed to measure.

A concrete example shall illustrate this: The MasterCard “Worldwide Centers of Commerce Index” [6], [7] uses the number of patent applications per million people as one of eight indicators for “knowledge creation and information flow”. While patent applications can in fact be regarded as a formalised display of knowledge creation, it should be borne in mind that “in many cases patents are registered in the headquarters, typically found in large cities, while they can be generated in other regions” [12]. Hence, the place where the patent application was lodged does not necessarily correspond with the place where this knowledge was actually created.

The validity and reliability of the metrics chosen may be particularly relevant with regard to indicators measuring economic performance, as has been argued in the open panel discussion. Currently, most measures of economic performance relate to GDP (GDP growth, GDP per capita, etc.).

C. Conclusiveness of Indexes and Economic Development Policy

While indexes might provide some insight and/or some additional information, they might not be regarded as particularly conclusive from an economic development policy perspective - a point also made in 13 most recent book on Australia’s competitiveness:

“The sources that assess economies as a whole [...] are helpful, but the reality is that nations, regions, and companies compete in specific industries versus specific competitors to serve specific customers. Aggregate measures cannot tell us what drives a nation’s competitiveness in individual industries.”

Similarly, Kresl and Singh [16, p.240] outline that local economies are exposed to “distant markets and competitors due to the cost- and distance-reducing consequences of technological change”, which is why competitiveness matters to local authorities.

V. CONCLUSION

Therefore, the first step towards designing and implementing effective economic development and competitiveness policies is to truly understand what the competitive local industries are and how their performance is compared to other (national as well as global) competitors. Only if this is the case the city or region can develop policies to attract the global leaders in this particular industry. Of course, there is the underlying desire to measure a city’s competitiveness to support the policy-making process. However, the discussed city rankings and indexes might not be as conclusive as an in-depth analysis of the local economy.

In a report on city competitiveness prepared for the World Bank Institute, Nollen [14, p.24] does take the results of these indexes seriously, however he concludes:

“[...] there is no single list of the features that any one city needs to have in order to be competitive. This complexity arises from the fact that the industry mix in one city or region will not be the same as in another city or region; industries differ in what is critical for their business environment, and accordingly what one city needs to be attractive to that industry will differ from what another city needs to be attractive to a different industry. One city need not emulate another city in the elements of its business environment unless the industry mix is or will be similar. “

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