Park syntax: Measuring open space accessibility and "smart growth"

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Abstract

The prevailing urban planning strategy in the 21st century in many European cities is urbanisation by densification. The strategy, which has obvious consequences for green and open space, has commonly been described as "Compact city" or "Smart growth". Densification has mainly been initiated by large building companies, often in conflict with local lobby groups with strong social capital. This has frequently led to deadlocks in planning, especially concerning green space exploitation. This paper suggests new tools for understanding and measuring how urban structuring affects open space accessibility, not only because urban structure distributes open space to people, it also creates users and stakeholders.

Since the 1950:s Swedish urban planning has been led by normative open space guidelines developed by research and national ministries, guidelines that are still present but has lost in power. Generally these guidelines are based on either density, i.e. sqm green space/person within a defined area, or range, i.e. maximum metric distance to a minimum park size. Planning practice has essentially dealt with size and qualities, often confusing, in micro economic terms, use value and non-use value (e.g. the "ecological"). This paper introduces new ways of integrating use value (sociotop) and orientation (axial lines) into new measures of open space accessibility. A new GIS-application "The Place Syntax Tool" (PST), developed within the research project, makes it possible to calculate the 'topological' open space accessibility from every place (address or plot) in an urban area, current or planned. 'Topological' accessibility analyses handles the "modified area unit problem" (MAUP) discussed in geography.

A questionnaire from 2001 (TEMO) states that, citizens in some dense inner-city-districts experience higher park and nature accessibility than in some low-density "green" suburbs in Stockholm. This peculiar result was the starting point of testing old and new measures in ten different city districts, using PST. The conclusion is that a new measure, which take range, orientation, green space size and number of use values into account, correlates considerably better to the questionnaire ($R^2 = 0,75p < 0,001$), than any conventional measures. It shows that the 19th century "deformed" inner city grid with defined urban parks connected by green boulevards more effectively distributes open space to many citizens compared with the "interrupted" grid and segregated green structure of the post war "modernist" suburbs.

Another finding is that axial lines seem to capture movement to and within open space better than any metric measure. Correlation was found when comparing observed pedestrian flow and calculated population accessibility (Södermalm $d_{ij} = 3, R^2 = 0,682, p < 0,001$; Högdalen $d_{ij} = 6, R^2 = 0,442, p < 0,001$). Correlation was also found when comparing a questionnaire asking "How often do you go to your favourite green area?" (USK 2002) and axial line distance between all addresses in the study areas and the closest green

area ($R^2 = 0,77, p = 0,018$). These results can also be explained by the Space syntax integration analysis which shows that the green spaces in the inner city grid is much more integrated than in the post war suburbs. This means that orientation plays a big part in determining if, and how often people visit open spaces.

Consequently, better measures could promote understanding of open space planning as an asset to city development, help overcome the deadlock in densification planning and change the common opinion of open space and "green" from a static to a dynamic urban entity.