

Urban Form and Social Sustainability Impact Assessment Using GIS and AHP (Analytical Hierarchy Process) Methods

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Abstract

Since sustainable concept development was born, the different dimensions of sustainability have not equally focused on. The center of attention has been into the concept of environmental 'sustainability' (Colantonio, & Dixon, 2011, Bramley et al, 2009, McKenzie, 2004, and Landorf, 2011). As the result, the most notable argument regarding the relationship between sustainability impacts and urban form become around environmental aspects of sustainability that encourage high density and mixed-use development to decrease urban sprawl and protect agricultural lands (Colantonio, 2009, Chan & Lee, 2008). However, other literatures discuss that, this perspective seems to not fully address how humans might interact in complex ways with social involvements. They argue if people have the choice, they would choose low-density suburban living rather than compact city (Woolley, 2002).

This research will review debates about social sustainability and highlight some expecting relationship to understand in what ways does urban form contributes to social sustainability. An extensive literature review was conducted in order to explore the concept of social sustainability and critically examine the main impact assessment methods and metrics established to measure its nature. It reviewed debates about urban form and social sustainability and highlight some expecting relationship to figure out different dimensions of social sustainability and to assess in what ways does urban form contributes it.

The empirical part of the paper will present some new evidence based on chosen neighborhoods in the five biggest metropolitan areas in Texas (Dallas, Fort Worth, San Antonio, Houston, Austin). Twenty neighborhoods from inner, middle and outer area of each of these metropolitan areas selected. All of these selected neighborhoods have been registered as an association with the related Cities. Census Block, and neighborhood associations' database from 2010 used to collect data and measure social sustainability dimensions. GIS software and Analytical hierarchy process (AHP) is used as a multi-criteria decision making (MCDM) method to aggregate the impacts of proposed criteria into a social sustainability index and to define relationship between these dimensions as a model. The result derived from regression modeling indicated how far different urban form could be explained by systematic relationships with different dimensions of social sustainability in neighborhood scale. Based on literature and dataset this research proposed social sustainability in micro-scale as comprising two main dimensions and nine proposed criteria: a) social capital and justice (access to local services, public transportation, affordable housing, and employment), and b) social cohesion and exclusion (participation and interaction in the community, cultural and community diversity, pride and sense of place, stability, and number of crime).

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