

WALKABLE AND ACCESSIBLE CITIES

SMART MOBILITY

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Introduction





ENVIRONMENT	URBAN DESIGN	PERCEPTION
Connectivity	Imageability	Aesthetics
Proximity	Enclosure	Sense of safety
Residential Density	Human scale	Sense of comfort
Land Use Mix	Transparency	Sense of traffic
Sidewalks	Complexity	Sense of cleanness
Slope		Level of interest
Greenness		
Traffic		

Objective

Subjective

Walkability measurable attributes review. By author based on Ewing and and Handy (2009), Leslie et al., (2007)



Potential walking areas







Victor and Klein (2011)

100 * Tan (((Slope_Up * Length_Up + Slope_Down * Length_Down) / Length_3D) * (3.1416/180))

Potential walking areas







Klein, et al. (2016)



Walkability variables





- Connectivity
- Population Density
- Accessibility
- Land Use Mix
- Proximity to Amenities
- Greenness

Datasets collected by IIC in latest projects:





Connectivity





Directness of links and the density of connection in a network. As connectivity enlarges, travel distances decrease and route options increase

Gamma Index:

$$\gamma = \frac{e}{3(n-2)}$$

- Participant's residence
- Nodes
 - Edges
 - Potential walking area





Population Density





The volume of travel demand is strongly related to walking quality (Cervero and Kockelman, 1997) and to personal business trips

 $PD = \frac{Number of inhabitants}{Area (hectares)}$

- Participant's residence
- Inhabitants
 - Potential walking area



Land Use Mix





Degree of heterogeneity with which functionally different uses are colocated in space (Leslie et al., 2007)







Accessibility





Where: P_k = percentage of feature's quality k

 W_k = weight of quality k



 Σ_{k} = - (P_k * W_K)

Accesibility of features

- O High (0)
- Medium (0.5)
- Low (1)

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Participant's Residence

Proximities to amenities





- Nearness to frequent destinations, as retail areas, services, public infrastructures and recreational spaces
- The availability of potential destinations together makes walking a more competitive and attractive mode of travel to other options (Saelens et al., 2003)



 Σ_k (W_k / D_k)

W_k = weight of amenity k (Daily = 30; weekly = 20; monthly = 10)

 D_k = Distance (travel time) to amenity k

Greenness

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Weight

1

0.5

0.25

0



$$\Sigma(p_k * w_k)$$

 P_k = percentage of greenness k W_k = Weight of greenness k

Overall scheme







Discussion





- Approach might not be compatible for every urban and cultural context
 - Data generally available, which allows cross country comparisons
 - Multi-scale approaches Individual residence level Municipal and Metropolitan
- The walkability index results can be crossed-checked with health surveys
- There are many other factors linked with walking behaviour
 Risk of crime Aesthetics
- Traffic Risk of crime Aesthetics Seasonal weather conditions

• Complementary studies of bikeability







- The walkability index provides an objective notion about the nature of the **build environment** significantly associated to **urban mobility**
- Inform decision makers of the efficacy of sustainable development in the mitigation of adverse **public health impacts** of urban form
- Potential for guiding **environmental and urban planning policies** to promote walking and active transportation





Thanks

... and to all of you for your attention

