P077

Walking behavior and neighborhood environment: A case study in Tokyo Metropolitan Area

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Introduction

- Walking is an activity that most people engage in and it is the simplest way for majority of people to go about their daily life. Walking behavior is important in both the aspects of personal health and urban mobility;
- Generally, walking behavior can broadly be categorized into three types: occupational, recreational and utilitarian walking. Among them, recreational and utilitarian walking are frequently compared with neighborhood environment;
- The purpose of this study is to detect the patterns of walking behavior with People Flow data of Tokyo and evaluate the neighborhood environment to find relationships between patterns of walking behavior and neighborhood walkability.

Methodology

Data Used

- People Flow Data of Tokyo in year 2008 (self-reported data to calculate resident's walking time)
- National Land Numerical Information
- Open Street Map (road network)
- Zenrin Data of Tokyo Metropolitan Area (year 2008/2009)

Index Selection

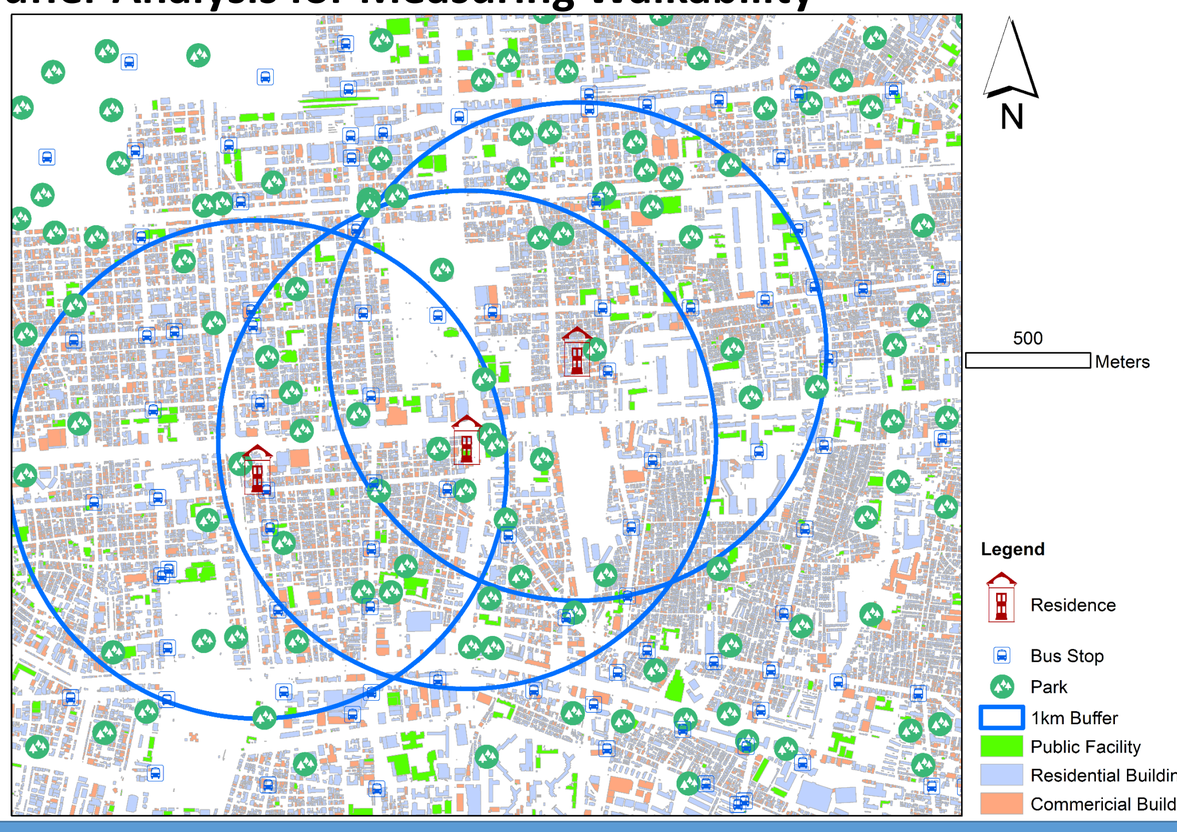
RD — Residential Density (count of residential buildings)
SC — Street Connectivity (count of intersections)
LUD — Land Use Diversity (mixed degree of land use)
BSD — Bus Stops Density (count of bus stops)
RSA — Railway Station Accessibility (distance to the closest station)
SSA — Sightseeing Spots Accessibility (distance to the closest spots)
GD — Greenness Density (average NDVI value within the neighborhood)
PD — Parks Density (count of parks)

Categorizing Walking Behavior

Code	Value		Code	Value	
1	To Office	UW	9	To Send/Pick Up Activity	UW
2	To School	UW	10	For Selling and Buying	
3	To Home	UW	11	For Appointment	UW
4	To Shopping Place	UW	12	To/For Work (Fixing and Repairing)	
5	For Dinner/Short Recreation	RW	13	To Agri./Forestry/Fishery Work	
6	For Sight Seeing and Leisure	RW	14	Other Business Purpose	
7	For Medical Treatment	UW	99	Others	
8	For Other Private Purpose				

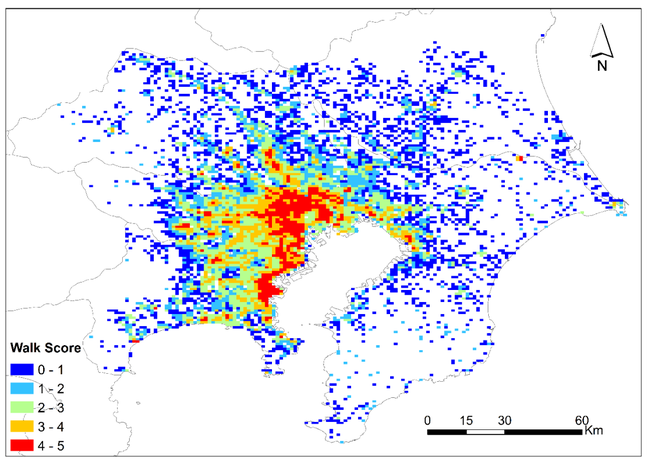
UW Utilitarian Walking RW Recreational Walking

Buffer Analysis for Measuring Walkability

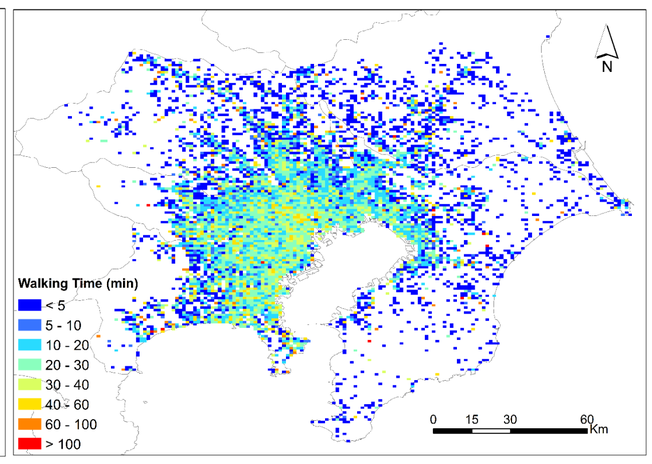


Results

Evaluation Result & Reality (utilitarian)



Utilitarian Walkability Map of TMA



Utilitarian Walking Time Map of TMA

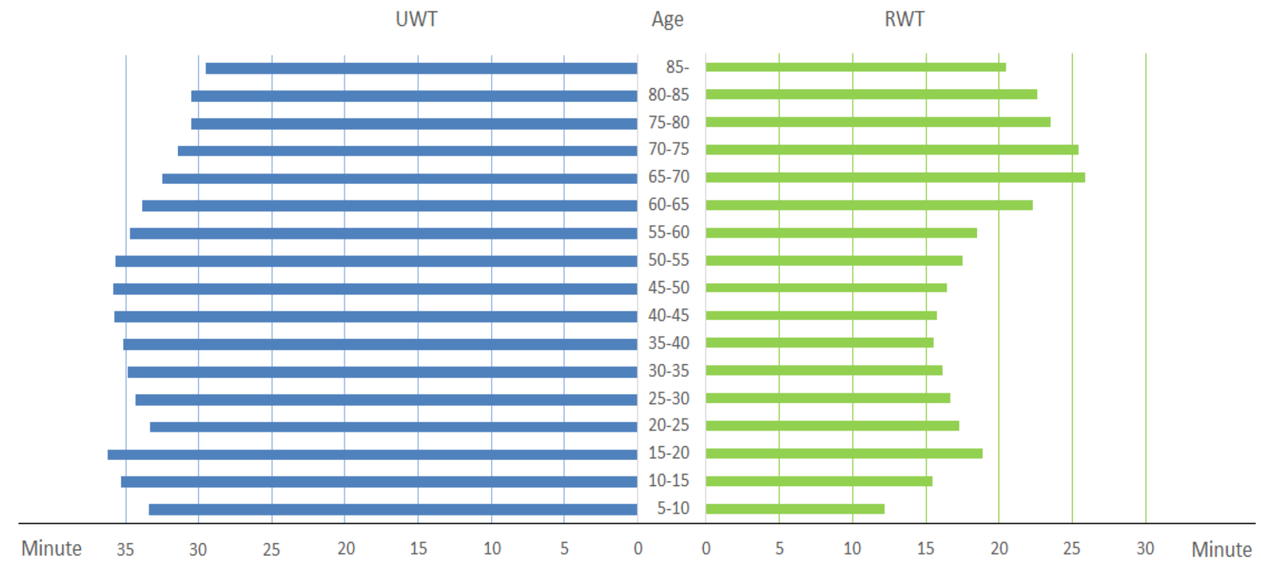
Utilitarian walking: walk to reach a place for further behavior. One selection among all the methods for movement (e.g. Walk, Bicycle, Bus, Vehicle, etc.).

Classification of area based on walkability (walk score)

Category	Walk Score	Max UWT	Mean UWT	Count
High Walkable Area	4 – 5	82	24.9	535
Medium High Walkable Area	3 – 4	62	22.2	961
Medium Walkable Area	2 – 3	182	17.1	1410
Medium Low Walkable Area	1 – 2	144	11.7	1560
Low Walkable Area	0 – 1	152	9.6	1288

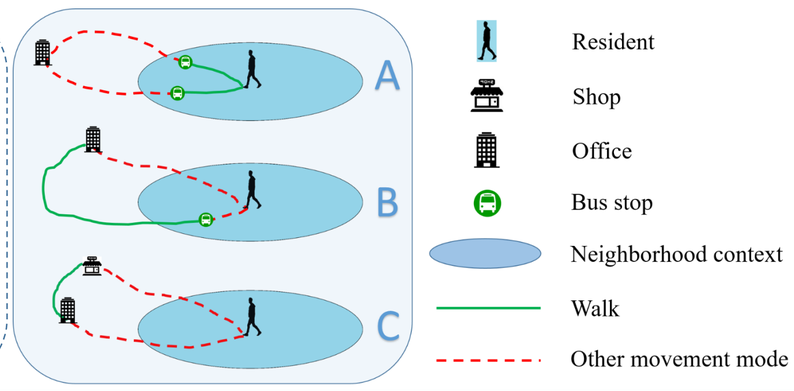
Note: UWT = Utilitarian Walking Time (in minute)

The Effects of Personal Attributes (age)



The Effects of Neighborhood Context

Only consider the walking behavior within the neighborhood context could improve the result of correlation between WT and Walkability.



Discussion and Conclusion

- Residents in urban areas with a good accessibility to the city center had the highest potential for utilitarian walking behavior, followed by the residents in the urban core and rural areas;
- The results of evaluating walkability had a consistency with the results of residents' walking time. This consistency proved criteria selected in this study are necessary for evaluating both utilitarian and recreational walkability in TMA;
- It is critical to study effects of personal attributes as well as neighborhood environments separately based on the type of the walking behavior.