Daily Walking Behavior and Neighborhood Environment: A Case Study in Tokyo Metropolitan Area

Hao HOU

Department of Spatial Information Science, Graduate School of Life and Environmental Sciences, University of Tsukuba

*Contact Email Address: houhao880828@gmail.com

Introduction

- Walking is a physical activity that most of the people engaged in and it is the simplest way for the majority of people to go about their daily life. The promotion of walking is critical in both perspectives of health and urban mobility.
- The term "walkability" was created as an index to evaluate the friendliness of the environment to walking. Key elements of a neighborhood with high walkability are high street connectivity, high land use mix and high residential density.
- The aim of this study is to detect the characteristics of people's walking behavior with the questionnaire-based People Flow data of Tokyo Metropolitan Area and evaluate the effects of personal attributes as well as the neighborhood environment on people's walking behavior.

Methodology

Extracting walking time and utilitarian walking time

- Record residents' home address by using time-based table of 3:00 a.m.;
- Input the ID-based table and extract the records with a query that: Transportation Mode = 1 (Walk);
- Separate the extracted table into utilitarian walking table table by using query sentences on the purpose of the trip;
- Count all the trip records (one record one minute) by person id and extract the total walking time, utilitarian walking time and recreational walking time of each person in one day;
- Link the result with the 3:00 a.m. time-based table to add the attribute of home address to the ID-based extracted tables.

Utilitarian walking (UW): walking happened with a clear propose related to their duties, such as go to work or go to school, in daily life.
Recreational walking (RW): walking happened in people's leisure time and for recreation, such as walking a dog or jogging in parks.
Occupational walking (OW): walking during working hours.

- Build neighborhood based on each residence;
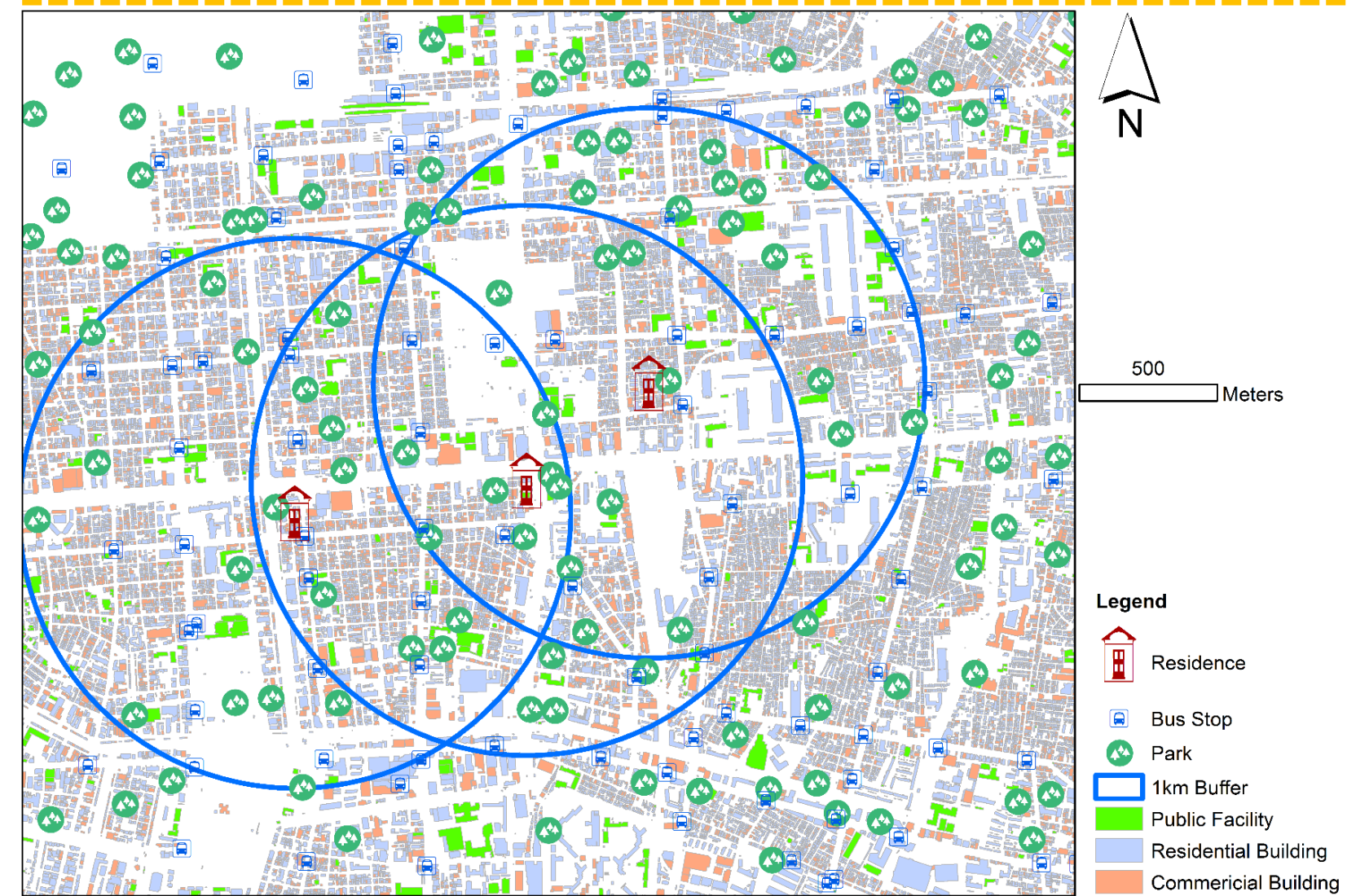- Summarize the objective features inside each person's neighborhood;

Fig. 1 An example of evaluating neighborhood environment by buffer analysis
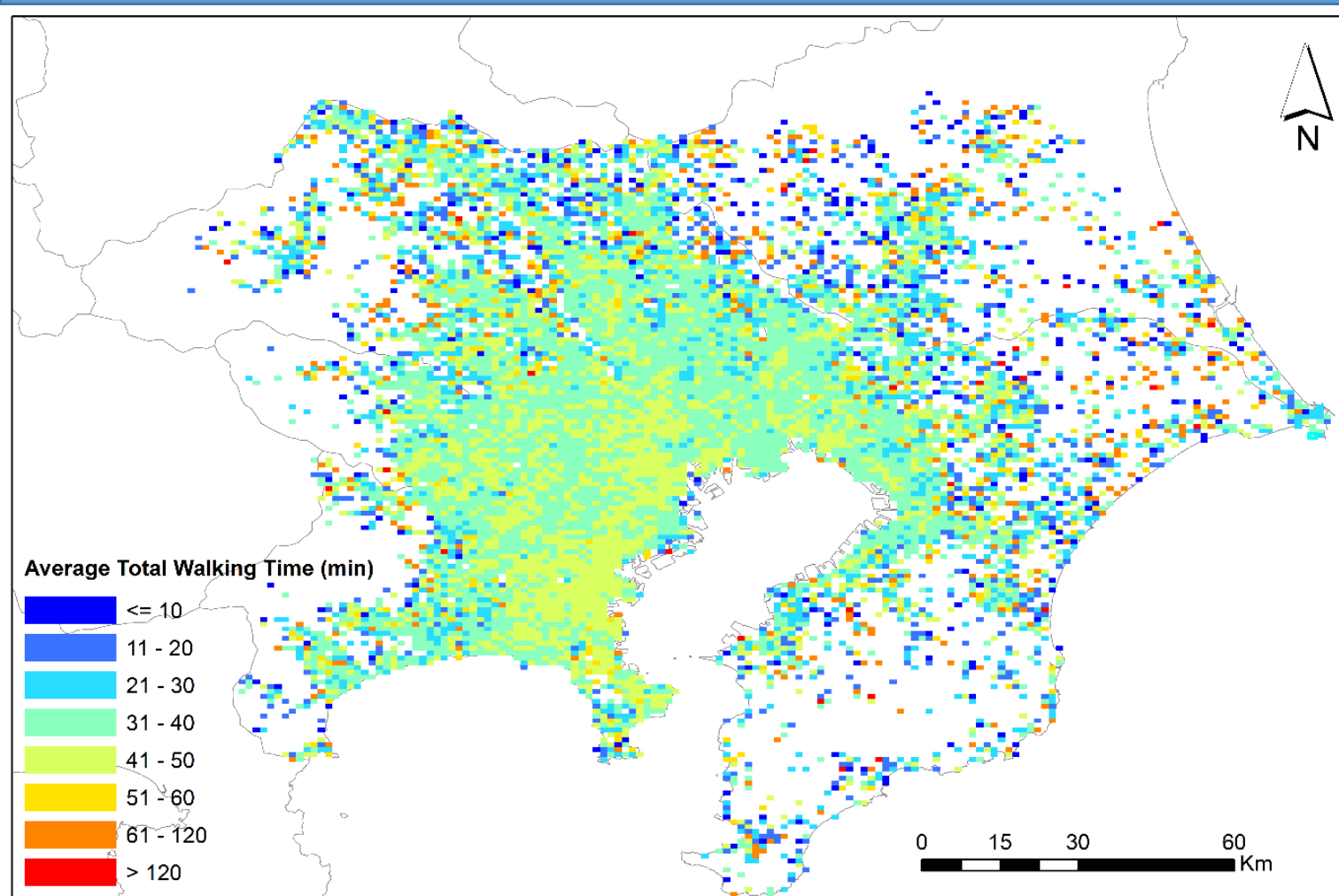
Results

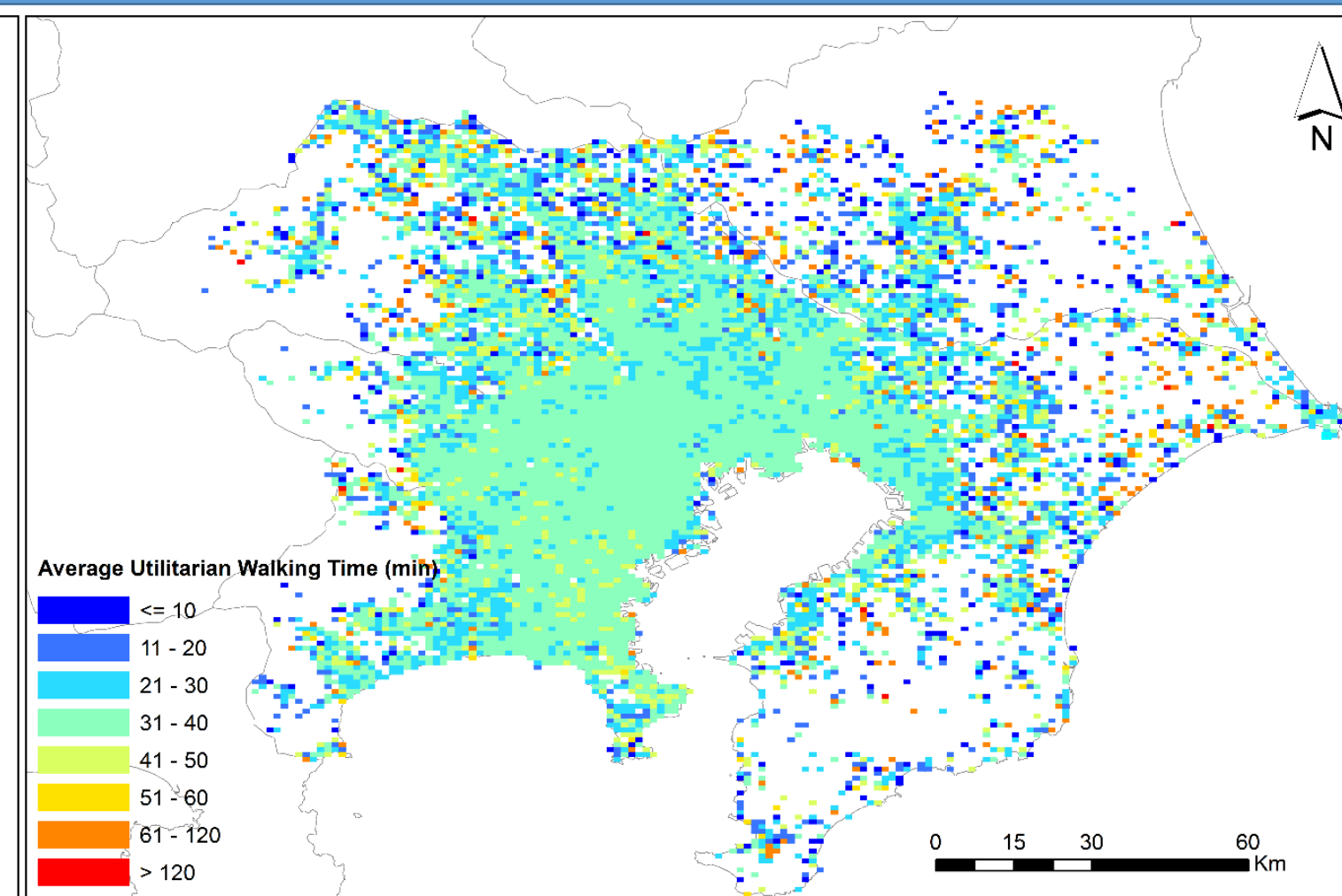Fig. 3 Average total walking time of residents in TMA

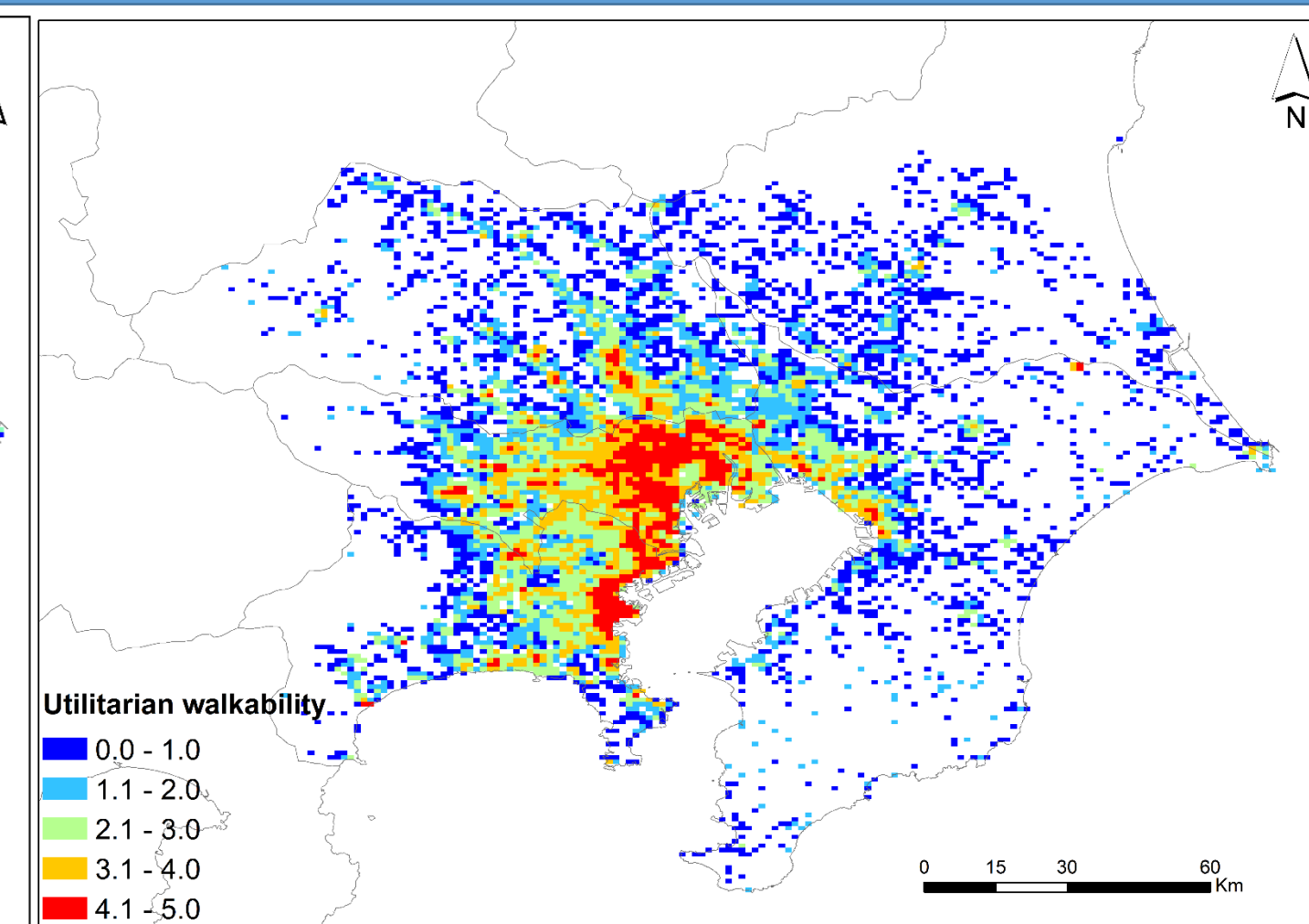Fig. 4 Average utilitarian walking time of residents in TMA

Fig. 5 Utilitarian walkability map of TMA

Residents in the low walkable area had an average UWT of 30.56 min/day and with the increase of utilitarian walkability, the average UWT kept increasing until the peak (35.53 min/day) with the utilitarian walkability reached the value between 4 and 5 which indicated a high walkable area. The size of each part in the pie chart represented the proportion of residents living in areas belonging to each category.
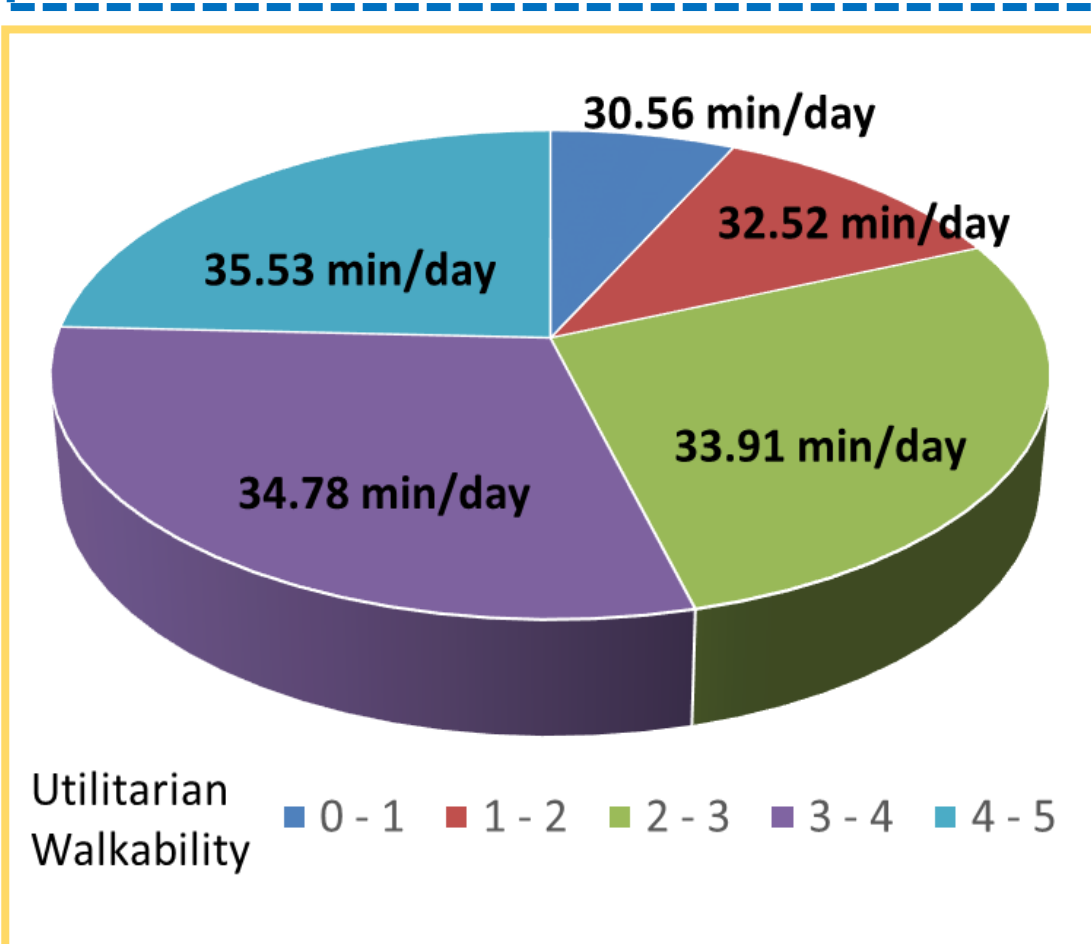

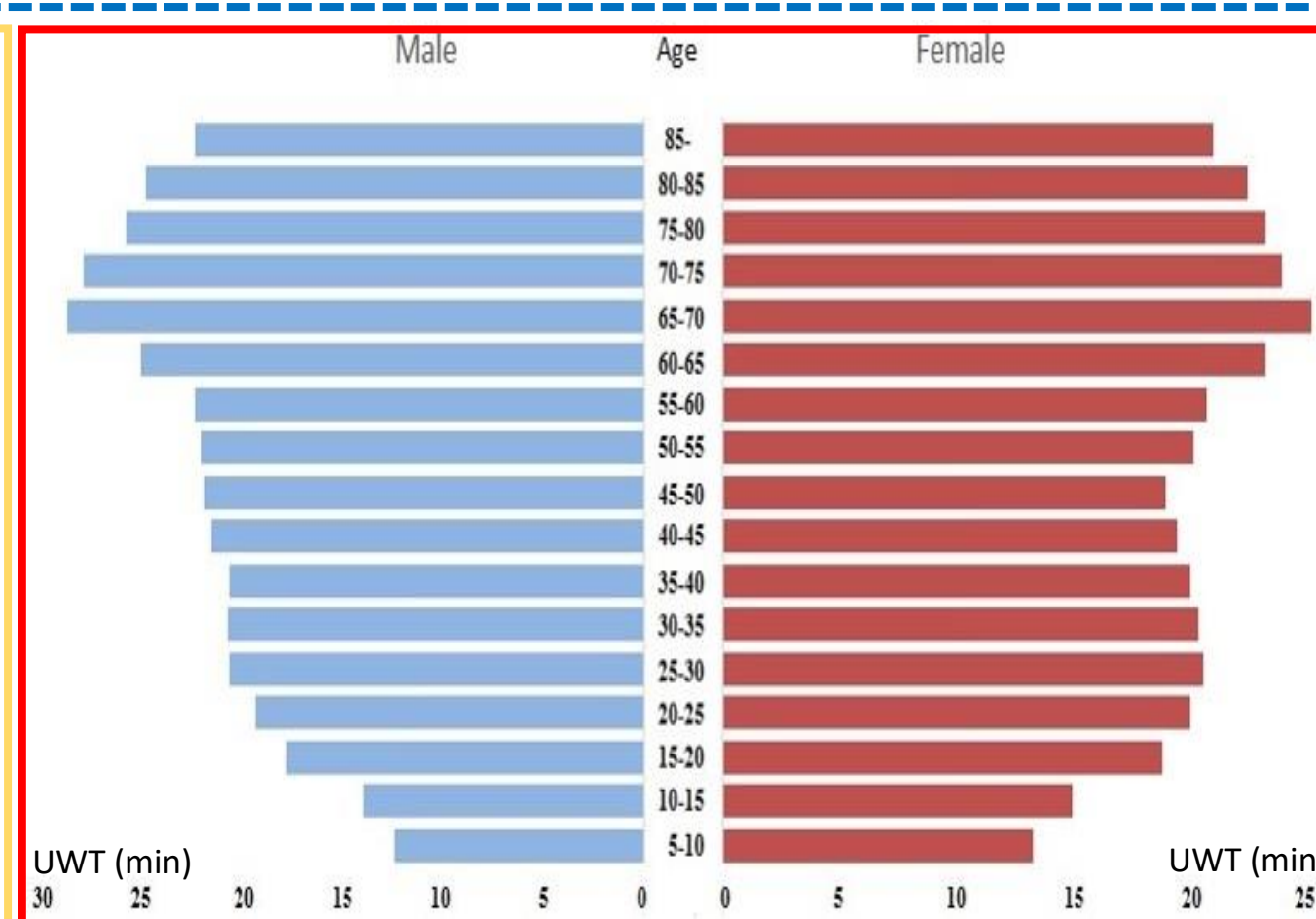
Fig. 6 Relationship between utilitarian walkability & UWT

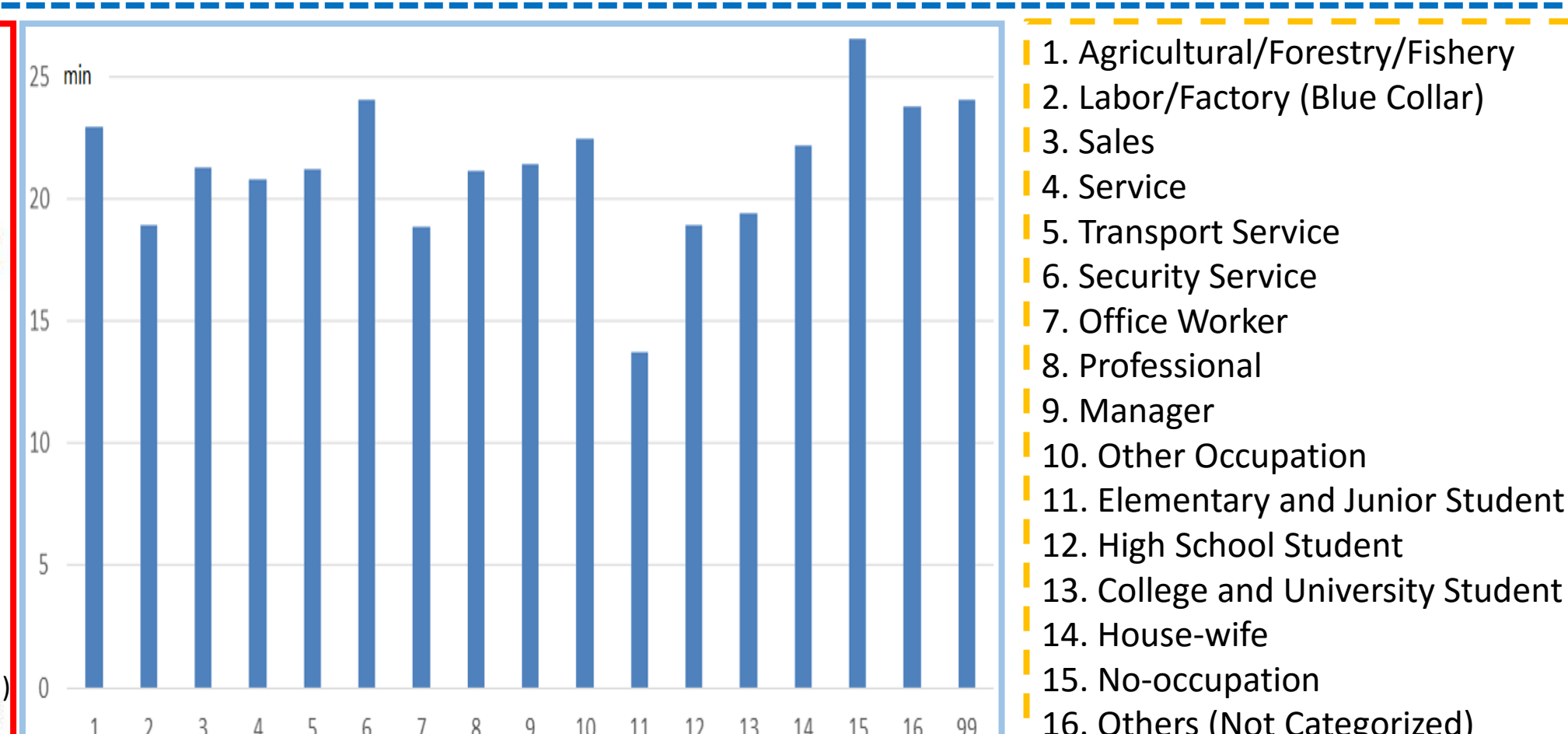Fig. 7 Age & Gender difference in people's utilitarian walking time

Fig. 8 Occupation difference in people's utilitarian walking time

1. Agricultural/Forestry/Fishery
2. Labor/Factory (Blue Collar)
3. Sales
4. Service
5. Transport Service
6. Security Service
7. Office Worker
8. Professional
9. Manager
10. Other Occupation
11. Elementary and Junior Student
12. High School Student
13. College and University Student
14. House-wife
15. No-occupation
16. Others (Not Categorized)
99. Unknown

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 in this study proved the value of studying effects of personal attributes as well as neighborhood environments separately based on the type of the walking behavior;
- The spatial patterns of the result had a consistency with the result of personal utilitarian walking time derived from the People Flow Data.

Acknowledgement