

TRAVEL BEHAVIORS OF THE DISABLED IN JAKARTA METROPOLITAN AREA

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SUMMARY

Jakarta metropolitan area is a capital region of one of the emerging countries, Indonesia, a member of G20. Some government agencies are becoming aware of the transportation issues of disabled people in line with the economic growth of the region while the notorious traffic congestion is one of the prime concerns. Public transportation systems and road networks of the region are virtually inaccessible for disabled people, which is the same as in other developing countries. This paper investigates travel behaviors of disabled people in urban areas of developing countries where the studies on these issues are scarce in order to determine policy options for the issue.

The Indonesian-Japan joint team conducted a commuter travel survey (CTS) in 2010 which covered 179,000 households in the region. Household and personal attributes including disabilities as well as travel behavior during commuting to work and school were surveyed. The team also conducted a transportation equity survey (TES) which targeted 200 people with disabilities for the purpose of understanding their daily travel behaviors and needs in transportation.

The CTS revealed that the lower the household income is, the higher the jobless ratio of the disabled is. Mode choices of the disabled have unique characteristics based on their income class. Roughly 50% of people with disability in high income households commute by car, while roughly a half of the disabled in middle income households commute by motorcycle. For the disabled in low income households, the majority have no alternative to using non-motorized transportation. Analysis on the workplace also articulately illustrates that workplace choices are affected by disability and household income.

In light of the opinions and preferences of the disabled regarding transportation in the region, TES implies that introduction of specialized transportation for the disabled, as well as financial assistance, may increase their mobility. While introduction of barrier free sidewalks also increases their mobility, it seems that it would not be efficient to renovate all the sidewalks in the region. Training of the transportation planners and designers regarding universal design could be effective. It is hoped that the findings in this paper can be clues for planning transportation of the disabled in developing countries.

Key Words: travel behavior of disabled people; developing countries; household travel survey

PURPOSE OF THE STUDY

Jakarta metropolitan area, a rapidly growing metropolis with roughly 28 million population, is facing serious traffic congestion due to a fundamental shortage of transportation infrastructure and rapid motorization [Kawaguchi et. al, 2010]. Although the traffic congestion has been one of the top priority issues in the region, the governments are gradually becoming aware of the significance of equity in transportation [Kawaguchi and Hagiwara, 2010]. However, the barrier free concept is not widely understood or valued by the general public. As a matter of fact, almost all land transportation infrastructures in the region are virtually inaccessible for the disabled. Their travel behaviors remain unstudied as well.

Travel behaviors of the disabled in the developed countries have been studied. O'Neill and O'Mahony [2005] have surveyed the frequency of public transportation use, transportation modes and so forth as well as accessibility ratings of public transportation in the Greater Dublin Area of Ireland. Only 1 out of 25 wheelchair users use public transportation every day while 10 out of 16 visually impaired persons are everyday public transportation users. Suggestions from the respondents also implied some inexpensive measures such as adjusting the height of timetables at stops and announcing stops on board the vehicle on approach can improve accessibility significantly.

The Disabled Persons Transport Advisory Committee (DPTAC) of the United Kingdom surveyed attitudes of the disabled people to public transportation [DPTAC, 2002]. The survey revealed that the disabled people travel a third less than the general public and have a high dependency on transport in cars driven by someone else, and yet the disabled have high expectations for future public transportation systems.

With regard to developing countries, some countries have already formulated a legal framework such as the Persons with Disabilities Act of 1995 in India [Venter et. al, 2003] and Act of the Republic of Indonesia Number 4, of 1997, Concerning Disabled People [1997]. Detailed regulatory frameworks to support the laws have also been formulated in Costa Rica and Argentina [Venter et. al, 2003].

The results of research undertaken in developed countries may provide information regarding disabled people in general, however, travel behaviors of the disabled in developing countries have to be discussed in conjunction with the poverty issue as well as the financial restriction placed on the governments. In most cities, people are dependent on road transportation. While the high income group can easily access a private car or a motorcycle, low income individuals are dependent on bus transportation and non-motorized transportation. At the same time, the governments usually run short of transportation budget due to unstable governance and the high priority that they place on the congestion issue. This results in inadequately maintained sidewalks.

Although there are a variety of studies on policies for disabled people in developing countries such as a policy framework toward accessible transport by development stage [Venter et. al, 2003], an analysis on regulatory framework and infrastructure condition in cities in Vietnam [Nguyen, 2010], and design of road crossings in India [Singh and Gupta, 2010]; studies on travel behavior of the disabled in conjunction with the poverty issue as well as the policies required for them are scarce.

To propose appropriate and feasible policy options to secure the civil right of mobility for people with disability, understanding their travel behavior is essential. In this paper, their travel behaviors in Jakarta metropolitan area were investigated by utilizing a large-scale household travel survey and an interview survey for disabled people. In addition, their needs were identified by utilizing the other interview surveys in the region.

TRANSPORTATION AND BARRIERS IN JAKARTA METROPOLITAN AREA

1. Laws and Regulations on Barrier Free Facilities

Fundamental rights of disabled people including accessibility to permit them to live independently are stipulated in the Act No. 4, of 1997, Concerning Disabled People. The act and the Governmental Regulation of the Republic of Indonesia, No. 36, of 1980, Social Welfare for the Disabled, secure equal opportunity especially in education and employment. The road traffic Act (No. 22, 2009) and government regulations under this act also obligates the governments to consider persons with disabilities and the elderly. In addition, Jakarta province issued 2011 Regional Regulation No. 10 for people living with disabilities, which stipulates accessible public transportation, education, health institutions and public facilities. In terms of legal framework, the conventional pity-based approach for people with a disability has already shifted to a rights-based approach.

2. Public Transportation

Bus rapid transit (BRT), ordinary buses and railways are major forms of public transport in the region. BRT were designed with a barrier free concept such as handrails, ramps and platforms with the same height as the bus doors, while ordinary buses are substantially inaccessible. Almost all railway stations are inaccessible as well, although a few stations have elevators. Even for BRT, the condition is far from ideal for people with disabilities. For instance, there are some stops that have no ramps, there is a lack of space for wheel chair users in bus coaches, lack of vocal guidance, and signs without consideration for people with impaired vision.



Figure 1 Typical Ramp, Platform and Shelter of BRT in Jakarta

3. Pedestrian Environment

In general, Jakarta's road system is a car oriented system rather than pedestrian oriented [Kawaguchi and Hagiwara, 2010]. While major arterial roads in the central business districts (CBD) have sidewalks, these are not accessible even for people who do not have a physical disability. Three factors; design without consideration of disabled people, lack of maintenance and loose law enforcement are negatively affecting access to the walking environment in the region as shown in Figure 2. The top left picture shows "designed" barriers on sidewalks. The pedestrian deck, the bollards, the tree and the poles block not only vehicles but also pedestrians. High curbs without a ramp for wheel chair users to climb the curb are shown in the left bottom picture. Holes and cracks in the sidewalks due to lack of maintenance are also barriers for pedestrians as shown in the two pictures in the center. Loose law enforcement also enhances illegal road use such as stalls, vendors and motorcycle taxi pools. These things taken together with inaccessible buildings and public transport make it necessary to improve the accessibility of entire networks.



Figure 2 Typical Barriers of Sidewalks in Jakarta

DATA SOURCE AND METHODS

The commuter travel survey (CTS) was conducted in 2010 which covered roughly 180,000 households which correspond to 3% of the entire population of the region as a part of the JABODETABEK Urban Transportation Policy Integration Project (JUTPI), a Japan-Indonesia joint technical cooperation project aiming to improve urban transportation systems in the Jakarta metropolitan area (JABODETABEK), to ease traffic congestion and to develop urban economic activities. The team also conducted a transportation equity survey (TES) which targeted 200 people with disabilities in 2010.

1. Commuter Travel Survey

The commuter travel survey is a household interview survey focused on commuting trips such as going to work and going to school. Household and personal attributes including disabilities and social status were surveyed for all members of a randomly sampled household. In addition, the commuting travel behaviors trips were surveyed

for commuters. Each respondent was weighted by the surveyed zone, gender and age group to estimate the numbers in the whole region. Since the estimated number of vehicles in the regions by CTS was less than the vehicle registration data from the regional revenue offices (called *DISPENDA* or *Dinas Pendapatan*), the weights were adjusted to maintain consistency. The adjustment method is described in the paper by Yagi et al [2012].

Disability Type	All Respondents	Commuter Respondents
Visual Impairment	3,200	1,239
Hearing Impairment	731	196
Speaking Impairment	250	95
Ambulant Disability	619	193
Intellectual Disability	270	107
Other Mental Disorder	168	85
Complex/Others	600	161
No Disability	646,195	330,350
Unknown	5,117	2,542
Total	657,150	334,968
Total Weighted Population	27,900,000	14,300,000

Table I Sample Size by Disability Type of Commuter Travel Survey

2. Transportation Equity Survey

The transportation equity survey was conducted for disabled people, elderly people and the poor for the purpose of understanding their travel behaviors and their needs in transportation and a part of the survey of the 200 disabled persons was utilized for this paper. Several facilities where the target group are living and gathering were selected for the survey considering geographical distribution and proportion of disability types acquired from the survey in 2008 [BPS, 2008]. Most of the respondents were from households with a monthly income of less than 6 million rupiahs.

The TES survey forms include questions on major destinations, transportation modes, availability of assistance, reasons for mode choice, evaluation of each mode, impacts, and opinions regarding the installation of new transportation policies for the disabled. Most of the questions are choice questions while some questions are open-ended such as description of impairment and disability and the transportation issues in the region.

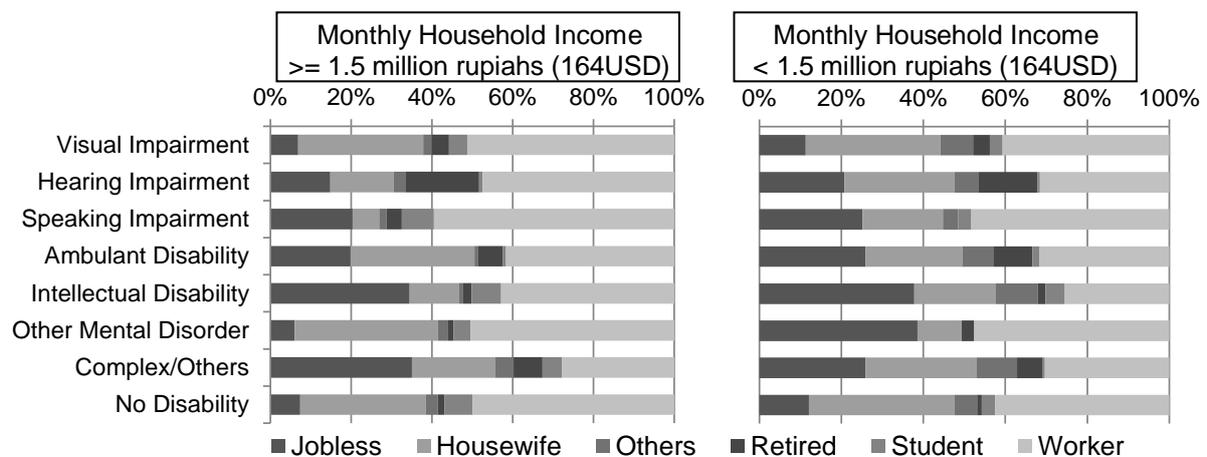
Disability Type	No. of Respondents
Visual Impairment	47
Hearing & Speaking Impairment	57
Ambulant Disability	26
Intellectual Disability	9
Other Mental Disorder	15
Complex/Others	30
Total	200

Table II Sample Size by Disability Type of Transportation Equity Survey

RESULTS

1. Commuter Travel Survey

One of the key pillars of the Indonesian Act concerning people with disability is providing disabled people with equal job opportunities. The CTS results illustrated that the social status of disabled people, including their jobless ratio. Jobless ratios of disabled people are significantly higher than that of people with no disability, especially for lower income groups. For people with Intellectual disability or with ambulant disability or with more than one disability, jobless ratios are higher and ratios of workers are lower. On the other hand, those of people with visual impairment are almost the same as people with no disability. This may imply that the government policy of providing job opportunities is effective for some specific groups.



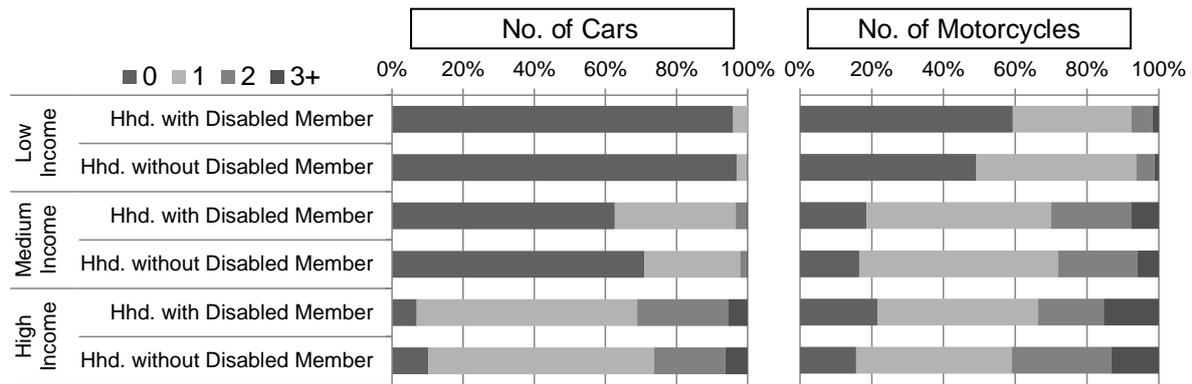
Note: Only population of working age from 18 to 59 years old was utilized to depict the above graphs. Weighted number of persons was utilized.

Figure 3 Social Status by Disability Type by Income Group of Working Ages

Car and motorcycle ownership affects mobility of disabled people. It is not surprising that the number of vehicles in a household increases in line with the increase in income level. The car ownership ratios of households with a disabled member are higher than those without a disabled member for all income groups though the differences were not highly significant. It is noteworthy that the motorcycle ownership ratios are the opposite; the motorcycle ownership ratios of households with a disabled member are lower. While the number of registered motorcycles has increased by a factor of four in this decade [Kawaguchi et. al, 2010], it might be different for households with a disabled member. This implies that those households prefer to purchase a car rather than a motorcycle considering the physical condition of the transportation infrastructure in the region as well as their disabilities.

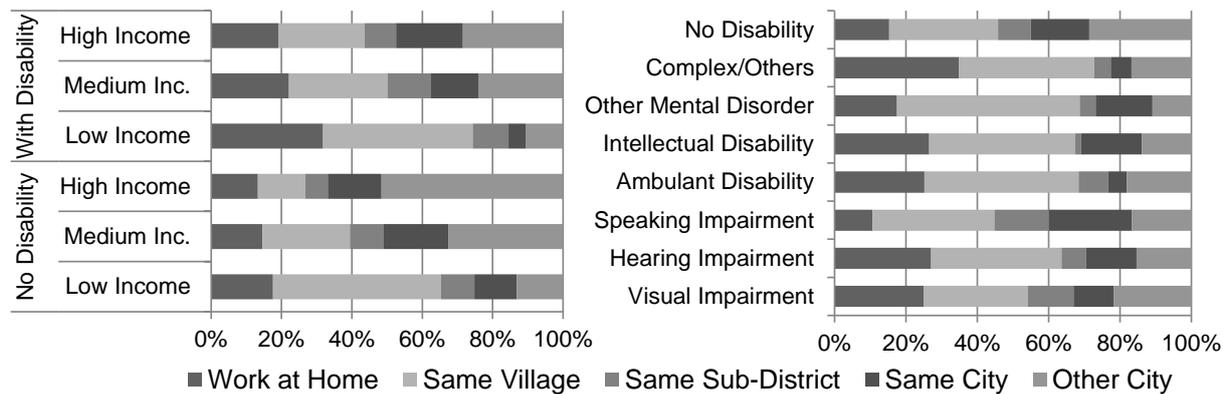
Workplace choice and transportation mode choice are key factors for transportation planning. Locations of the workplaces of the respondents are shown in Figure 3. Workplaces of people with a disability and in lower household income groups are closer to their homes. For instance, more than 70% of people with a disability that are also in a low income household (less than 164USD per month) work at home or work in their village. It is anticipated that their mobility is considerably restricted by both disability and poverty. The figure articulately illustrates that workplace choice is affected by disability and household income. With regard to disability type, people

with speaking or visual impairment tend to choose more distant workplaces while people with several disabilities choose close workplaces.



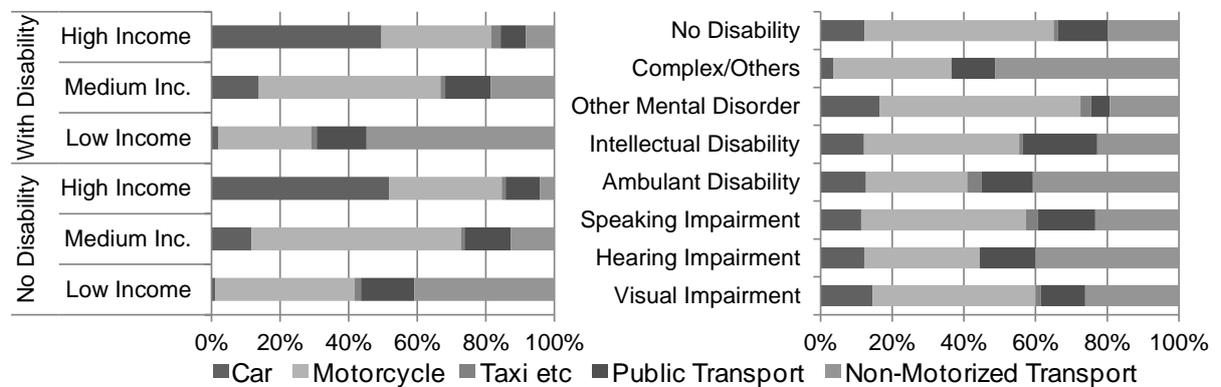
Note: Hhd. means household. Weighted number of households was utilized. Low income group monthly household income is less than 1.5 million rupiahs (164USD); medium income group is 1.5-6.0 million rupiahs (164-654 USD); high income group is equal to or more than 6.0 million rupiahs (654USD).

Figure 4 Household Vehicle Ownership by Income Level by Disabled People



Note: Only workers' data was utilized to create the above graphs. Weighted number of persons was utilized. Inc. means income. Same village/sub-district/city means the same village/sub-district/city as the home of the respondent.

Figure 5 Location of Workplace by Income Level and Disability Type



Note: Only workers' data were utilized to depict the above graphs. Weighted number of persons was utilized. Inc. means income.

Figure 6 Transportation Mode to Workplace by Income Level and Disability Type

Mode choice of the disabled is unique in relationship to their income class. Roughly 50% of people with a disability in high income households commute by car, while roughly a half of the disabled in middle income households commute by motorcycle. For the disabled in low income households, the majority have no alternative to using non-motorized transportation. However, this proportion is not significantly different from the people with no disability for high and medium income groups. It is also noteworthy that the share of public transport is higher for lower income households. It is assumed that they have no alternative to using public transport in spite of its lack of accessibility.

2. Transportation Equity Survey

The TES results provided information on policy impacts and preference for accessibility measures. The potential for increasing the number of trips by implementing proper policy options are depicted in Figure 7. More than 80% of respondents answered that they would increase their number of trips if the fares for transportation were made less expensive. Priority seating, assistance in riding buses, special transport service and improvement of signs and provision of information also may increase the number of their trips. The respondents were also asked whether they could travel alone if they were provided with better policy options. Special transport service showed the highest potential to enable them to make a trip alone.

The respondents were requested to prioritize policy options as shown in Figure 8. Though there were variations by disability type, the share of the special transport service was the highest for most disability types. Shares of Barrier free sidewalks, assistance in public places, barrier free facilities at stops and stations were also rated highly.

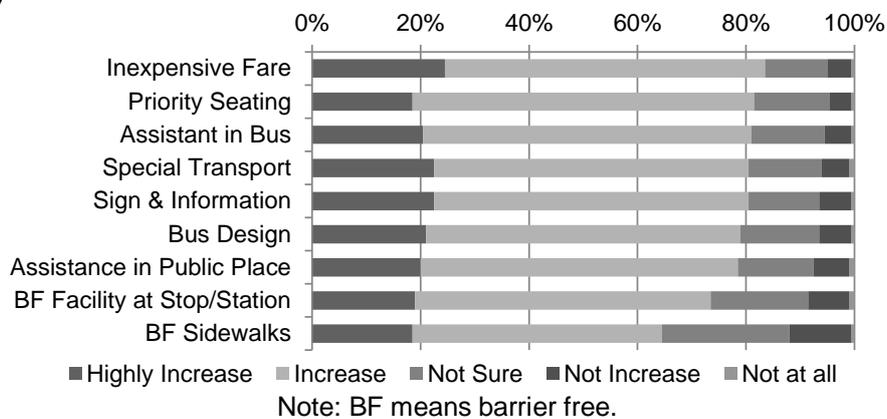


Figure 7 Potential of Increasing the Number of Trips by Policy Options

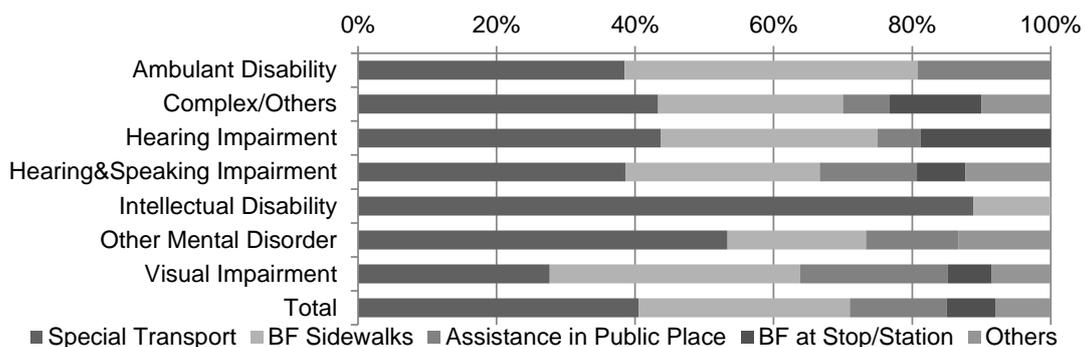


Figure 8 Policy Options of Top Priority by Disability Type

DISCUSSIONS AND CONCLUSIONS

The CTS survey results illustrated distinct travel characteristics by income level. It also implies that the mobility restrictions of low income groups affect their transportation mode choice and workplace choice. The TES results indicated that affordable public transportation may increase the chances of going out for people with disabilities. Considering these things, provision of taxi tickets or special fares for public transportation could contribute to improve the mobility of people with disabilities, especially in the poverty stricken households. In view of the usually restricted financial resources of local governments in developing countries, it would be more affordable for them to focus on the disabled in the poverty group rather than on the population as a whole.

A special transport service is one of the most sought after policies for disabled people. Considering the current inaccessible transportation infrastructures in Jakarta metropolitan area, it seems that it is not sensible to renovate all the infrastructures in a short time. It is also assumed that some people with disabilities will not have an alternative to using the special transport services such as paratransit due to their physical conditions. For them, the special transport service will be an essential policy. Since this could be a financial burden for local authorities in developing countries, it is expected that it would be more financially efficient to effectively utilize existing facilities. For instance, minibus services are facing excessive competition due to rapid motorization. Therefore, some local governments have started to restrict the supply of bus service [Kawaguchi and Kuromizu, 2012]. These redundant services can be converted to the special transport service.

An accessible walking environment is also fundamental infrastructure for all citizens, including people with disabilities. It is, however, not realistic to renovate all the sidewalks in a short time considering the financial constraints. As described in Figure 2, some sidewalks are inaccessible due to inappropriate design. Thus, training for the transportation planners and designers in universal design could be effective. By utilizing technical assistance from developed countries for the training, local authorities can save their limited assets. A set of policy of providing work space for stalls and strict law enforcement might create a walking space.

The CTS provided precious information regarding people with disabilities, including fundamental travel behaviors in urban areas of developing countries. It clarified the combined impact of disability and poverty. The TES also provided implications on effective transportation policy options for them. By utilizing these results with analysis of current barrier free conditions, several policy options were proposed incorporating financial restraint for the developing countries. It is hoped that the findings in this paper can be clues for planning transportation of the disabled in developing countries.

For the future steps, it is expected to conduct a feasibility study on the abovementioned policy options, including cost estimations and demand forecasts. Since the Jakarta metropolitan area is a relatively well developed area compared with the rest of Indonesia and other developing countries, further studies in rural areas or less developed areas is awaited.

REFERENCES

- Act of the Republic of Indonesia Number 4, of 1997, Concerning Disabled People. 1997. [Internet] English translation is available from:
<http://www.unescap.org/esid/psis/disability/decade/publications/z15007le/z1500705.htm#indonesiaB>. March 25, 2012 accessed by the author.
- Badan Pusat Statistik Republik Indonesia (BPS, Statistics Indonesia). 2008. *Statistik potensi desa Indonesia* (Village potential statistics of Indonesia). Jakarta.
- Disabled Persons Transport Advisory Committee (DPTAC). 2002. *Attitudes of disabled people to public transport*. London.
- Kawaguchi, H. and Hagiwara, T. 2010. "Travel Characteristics of elderly persons and transition in transport system in Jakarta", *Proceedings of the 12th International Conference on Mobility and Transport for Elderly and Disabled Persons*.
- Kawaguchi, H. and Kuromizu, K. 2012. "Minibus Service in Bogor City, Indonesia - A Challenge to Rapid Motorization", Presented at *91st Annual Meeting of the Transportation Research Board*, Washington, D.C., 2012.
- Kawaguchi, H., Wachi, T. Alvinsyah, Hamada, K. and Yagi, S. 2010. "Transition in Mode Choice Due to Motorization and Improvement of Public Transportation System in Jakarta", *Proceedings of the 12th World Conference on Transportation Research*.
- Nguyen, Thi Thanh Huong. 2010. "Which accessible and safe road is ensured for the elders and the disabled people? -The case in Hanoi and Ho Chi Minh, Vietnam", *Proceedings of the 12th International Conference on Mobility and Transport for Elderly and Disabled Persons*.
- O'Neill, Y. and O'Mahony, M. 2005. "Travel Behavior and Transportation Needs of People with Disabilities - Case Study of Some Categories of Disability in Dublin, Ireland", *Transportation Research Record: Journal of the Transportation Research Board*, No. 2005, Transportation Research Board of the National Academies, Washington, D.C., pp. 1-8.
- Singh, Ashok and Gupta, Anshu. 2010. "Accessible road crossing for all", *Proceedings of the 12th International Conference on Mobility and Transport for Elderly and Disabled Persons*.
- Venter, C. J., Rickert, T. E. and Maunder, D. A. C. 2003. "From basic rights to full access - Elements of current accessibility practice in developing countries", *Transportation Research Record: Journal of the Transportation Research Board*, No. 1848, Transportation Research Board of the National Academies, Washington, D.C., pp. 79-85.
- Yagi, S., Nobel, D. and Kawaguchi, H. 2012. "Time-series comparison of auto/motorcycle ownership and mode choice models in an ever changing transportation environment in Jakarta, Indonesia", Presented at *91st Annual Meeting of the Transportation Research Board*, Washington, D.C., 2012.

Note: Currency rate of 1 USD = 9,173 IDR as of March 22, 2012 was utilized throughout this paper.

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