

Pedestrian Reactions when Passing by in the Sidewalks

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Abstract: Walking is a daily activity made by a human being. It is a part of transportation system which facilitates people movement from one place to another, especially when the trip is impossible to be conducted by vehicles. Therefore, sidewalks should be integrated with overall transportation system, including with parking lots and public transport stops. The aim of this research is to understand pedestrian reactions when passing by in the sidewalks. Data collection was conducted using online questionnaires. Analysis was done by both one sample t-test and independent samples t-test. The main result was that the current standard of sidewalk width, needs to be widen from 1.5 m to 2 m in urban setting.

Keywords: Pedestrian Reactions, Passing By, Sidewalks

1. INTRODUCTION

Walking is a daily activity made by a human being. It is a part of transportation system which facilitates people movement from one place to another, especially when the trip is impossible to be conducted by vehicles. Therefore, sidewalks should be integrated with overall transportation system, including with parking lots and public transport stops. The aim of this research is to understand pedestrian reactions when passing by in the sidewalks.

Data collection was conducted using online questionnaires. Analysis was done by both one sample t-test and independent samples t-test. Significant level used was 0.05. The main result was that the current standard of sidewalk width, needs to be widen from 1.5 m to 2 m in urban setting. Rather than conducting the data collection online, it was suggested that offline (direct) data collection was done.

2. LITERATURE REVIEW

Walking is one of transportation system which has an important role in a city space, mainly to connect between area functions and transportation modes. Walking is a tool to fulfil internal movement in the city, the only tool to fulfil face to face interaction need which exist within commercial and cultural activities in city life environment [1] Walking is a last mile transportation mode not causing air and noise pollution, not involving waiting time as in public transports, healthy and affordable [2]

[3] walking is the only internal city movement mode to fulfil interaction need requirements, social communication, and commercial and cultural activities in city life. Some of advantages of walking:

- 1) To ease people to conduct interaction between transport modes.
- 2) Due to the low speed, might observe the surrounding environments and objects.
- 3) People free to arrange their steps, make turns, make stops, and contact with surrounding environment.
- 4) Walking enables people to reach places which can't be reached by other transportation modes.

The aim of walking can be categorized as follow [4]:

- 1) For walking to workplaces or functional trip, the pedestrian path is designed for specific purposes such as business or dining trips.
- 2) Walking for shopping purpose might be free (unlimited time), relatively relax, and with relatively low speed compared to walking to workplaces or functional trip. Average trip distance is longer and often not realized due to high area attractiveness.
- 3) Recreational walking can be conducted anytime in a relax manner. For such purpose, this should be facilitated with supporting facilities such as place for gathering, chatting lighting, trees/ flowers, etc.

Age of pedestrians affect walking behavior. Age of pedestrians is grouped into the following [5]:

- 1) Age 0 to 4: Learning to walk, requiring parents' supervision, and developing observation on surrounding environment.
- 2) Age 5 to 12: Increasing independence, weakness in observation on surrounding, and easy to involve in a distortion.
- 3) Age 13 to 18: Less sensitive and attitude distortion.
- 4) Age 19 to 40: Active and very aware to traffic environment.
- 5) Age 41 to 65: Slower reflects.
- 6) Age above 65: Difficulties to cross the road, decreasing eyes sight abilities, difficulties to hear vehicles from the back and high dead rate.

Based on the beginning mode, the pedestrian is categorized into 4 types as follow according to [4]:

- 1) Full pedestrian who totally walk from the origin to the destination due to its short distance, usually for recreational purpose which is easier by walking.
- 2) Pedestrian who also use public transport who only walk as a connecting mode to the public transport.
- 3) Pedestrian who also use both private and public transport who only walk as a connecting mode from private vehicle parking space to the public transport stop.
- 4) Full private vehicle user, who only walk from parking space to final destination as the final destination is only reachable by walking.

[6], walking for a certain distance depends on the following factors:

- 1) Time Period: In recreation setting or shopping situation, walking for 2 hours or 2 miles can be achieved without the pedestrian realize.
- 2) Convenience: Pedestrian convenience is affected by weather and type of activity factors.

Bad weather will affect the need to walk. In Indonesia with tropical climate and quite hot environment may decrease the requirement to walk.

- 3) Availability of Motorized Vehicles: Availability of motorized vehicles affect greatly pedestrian demand.
- 4) Land Use Pattern: In a mixed-use pattern land use, walking might be more practical compared to using motorized vehicles, as by using motorized vehicles, they can't stop every time t. In this kind of land use, people are encouraged to walk as there are benches, food and drink stalls available to reduce tiredness.
- 5) Destination of the trip: Destination of the trip affect trip duration route choice.
- 6) Accessibility of the destination: Accessibility affect pedestrian behavior.

[7] Directorate General of Highways, Directorate Urban Road Development, the road free space divided into certain part as follow:

- 1) Road Used Space (RUMAJA): RUMAJA is a space limit by certain width, height and depth of certain road space. It contains of a median, road pavement, separator, shoulders, sidewalks, side-ditches, and road furniture.
- 2) Road Owned Space (RUMIJA): RUMIJA is a space along the road limit by certain width, height and depth of certain free space. It contains of RUMAJA and certain land outside RUMAJA. Its use is for road widening and additional traffic lanes in the future and safety spaces of the road.
- 3) Road Supervised Space (RUWASJA): RUWASJA is a certain space outside RUMIJA, and its use is under supervision of road developer, i.e., spaces along the road outside RUMIJA. It's use id under supervision of the road developer, i.e., spaces along the road outside RUMIJA limit by a certain width and height.

Table 1., describes the minimum road movement for a pedestrian [8]

Table 1. The Minimum Road Movement for a Pedestrian

Position	Space Requirement		
	Width (m)		Area (m ²)
	Front	Side	
Standstill	0.60	0.45	0.27
Walk	0.60	1.80	1.08
Walk carrying goods	0.75-0.90	1.80	1.35-1.62

The requirement for pedestrian facilities stated [9]:

- 1) Pedestrian needs to reach destination within minimum distance and safe from other traffic and smooth.
- 2) Continuity of pedestrian facilities connecting between areas. A sidewalk crossing a traffic stream may require traffic management, both using traffic light/ zebra cross or underpass/ overpass
- 3) Walking facilities needs to be made on urban road segments or on locations in which pedestrian volume reach the required level.
- 4) Sidewalks are advised to be located exclusively far from the busiest vehicle lanes to increase pedestrian safety.
- 5) Equipped with signs and other road furniture to allow comfortable movement of the pedestrian, especially people with physical disability such as using wheelchair or walking sticks.

- 6) Sidewalks could be designed to be parallel, non-parallel or crossing the existing traffic lanes.
- 7) Sidewalks surfaces should be made to be not slippery during the rain, not flooded and equipped with shading trees.
- 8) Sidewalks should be design higher than pavement for vehicular traffic to ensure comfortability and safety of the pedestrian.

On article 1 section 1 [9] regarding People with Disability, the definition of people with disability is everyone who has limited ability physically, intellectually, mentally and/ or sensory in a long term and have got problem to fully participate effectively with other citizens based on similar right.

3. METHODOLOGY

3.1 Method of Data Collection

The data collection was conducted online using google form questionnaires. The respondents were the Greater Jakarta residences, aged above 10 years old. There were 150 eligible respondents Likert scale from 1 (very rarely) to 4 (very often) was used. The questionnaires consist of general questions and perceptual questions. The general questions consist of name, age, address, job, mobile phone number, and monthly personal expenses. The perceptual questions are divided into 3x3 typical parts for each hypothetical sidewalk's width (1m, 1.5m, and 2m) and hypothetical pedestrian condition (normal, using walking sticks and using wheel chair) as follow:

- 1) You wait your turn to pass the incoming pedestrian.
- 2) You walk normally when passing the incoming pedestrian.
- 3) You walk (with slightly move away) when passing the incoming pedestrian.

3.2 Method of Analysis

The analysis was done using SPSS 26. Before conducting analysis, the normality, the validity and the reliability of the data were tested. The data was normal, valid, and reliable. A series of one sample t-test and independent sample t-tests (using general data as grouping variables) were done using significant level of 0.05.

4. RESULTS

4.1. Results of One Sample T-Test

Table 2. shows the result of the one sample t-test. It can be seen that from the respondents' answers regarding sidewalks with width of 1m and 1.5m the responses were less than 2.5, whilst for sidewalks with width of 2m the responses were above 2.5. This implies that respondents felt that sidewalks width of 1m and 1.5m were insufficient whilst sidewalk width of 2m was sufficient.

Table 2. Result of the One Sample T-Test

Width (m)	Mean	Mean Difference	Standard Deviation	α	Significant at 0.05
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					(Yes/ No?)
1.0	2.462	-0.037	0.313	>0.001	No
1.5	2.477	-0.022	0.272	>0.001	No
2.0	2.562	0.062	0.279	<0.001	Yes

4.2. Results of Independent Sample T-Tests

Table 3 shows the result of the independent sample t-test with gender as grouping variable. Male and female were the same on their perceptions on preferred sidewalks width.

Table 3. Result of the Independent Sample T-Test based on the Gender

Width (m)	Group	Number of Sample	Mean	F-Test Significance	T-Test Significance	Significant at 0.05 (Yes/ No?)
1.0	Male	107	2.457	0.660	0.793	No
	Female	43	2.472			
1.5	Male	107	2.464	0.690	0.363	No
	Female	43	2.509			
2.0	Male	107	2.573	0.459	0.450	No
	Female	43	2.534			

Table 4 shows the result of the independent sample t-test with age as grouping variable. Young adult respondent (<40 years old) and middle adult (\geq 40 years old) were the same on their perceptions on preferred sidewalks width.

Table 4. Result of the Independent Sample T-Test based on the Age

Width (m)	Group	Number of Sample	Mean	F-Test Significance	T-Test Significance	Significant at 0.05 (Yes/ No?)
1.0	<40 years	138	2.457	0.108	0.518	No
	>40 years	12	2.518			
1.5	<40 years	138	2.479	0.517	0.758	No
	>40 years	12	2.453			
2.0	<40 years	138	2.562	0.924	0.973	No
	>40 years	12	2.564			

Table 5 shows the result of the independent sample t-test with job is grouping variable. Student and Non-students were the same on their perceptions on preferred sidewalks width.

Table 5. Result of the Independent Sample T-Test based on the Job Status

Width (m)	Group	Number of Sample	Mean	F-Test Significance	T-Test Significance	Significant at 0.05 (Yes/ No?)
1.0	Student	81	2.451	0.040	0.640	No
	Non-Students	69	2.475			
1.5	Student	81	2.438	0.818	0.063	No
	Non-Students	69	2.521			
2.0	Student	81	2.574	0.318	0.554	No
	Non-Students	69	2.547			

Table 6 shows the result of the independent sample t-test with monthly expenses as grouping variable. Higher (\geq Rp. 2,160,000. -) and lower ($<$ Rp.2,160,000).- monthly expenses respondents were the same on their perceptions on preferred sidewalks width.

Table 6. Result of the Independent Sample T-Test based on the Monthly Expenses

Width (m)	Group	Number of Sample	Mean	F-Test Significance	T-Test Significance	Significant at 0.05 (Yes/ No?)
1.0	Higher Expenses	100	2.448	0.083	0.463	No
	Lower Expenses	50	2.488			
1.5	Higher Expenses	100	2.484	0.486	0.369	No
	Lower Expenses	50	2.462			
2.0	Higher Expenses	100	2.545	0.280	0.304	No
	Lower Expenses	50	2.595			

5. CONCLUSIONS AND RECOMENDATIONS

5.1. Conclusions

It is concluded that:

- 1) In general, pedestrian felt uncomfortable passing by another person in sidewalk width of 1m and 1.5m but felt comfortable passing by another person in sidewalk width of 2m.
- 2) Gender, age, job status and monthly expenses did not affect pedestrian perception on comfortable sidewalk width.

5.2. Recommendation

It is recommended that:

- 1) Minimum sidewalks width is increased into 2m.
- 2) For the next research, data collection should be conducted offline.
- 3) For the next research, scope of respondents should be wider.

REFERENCES

- [1] Pedestrian Planning and Design Satisfaction Level of Tarumanagara Fasilitas Pejalan Kaki. Kajian Kenyamanan Jalur Pedestrian Pada Jalan Imam Barjo Semarang. Enclosure, *Jurnal Ilmiah Perancangan Kota dan Permukiman* 2(6). (1998).
- [2] Site Planning for Cluster Housing.1990.
- [3] Law No. 8 on Disability.Decree of the Directorate General of Highways (1990), Directorate Urban Road
- [4] University Students on Pedestrian Facilities Surrounding Campus (On S.Parman Road). Tarumanagara International Conference on the Applications of Technology and Engineering.