User's Spectrum and Accessibility Level of Purabaya Bus Terminal, Indonesia

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ABSTRACT

The growing aging population in the World created awareness of accessible facilities for users with various abilities. Therefore, better inclusive planning and design of streets, paths, public spaces, and transportation systems are needed. Bus is the most chosen short-and-medium-distance transportation for Indonesian because of its affordable price and flexible timetable. But, most bus terminals are not accessible and this is the rationale of the research. Inclusive design could be a better answer to the problem. It is defined as "The design of mainstream products and/or services that are accessible to, and usable by, as many people as reasonably possible without the need for special adaptation or specialised design."

Purabaya Bus Terminal, is located in Waru, Sidoarjo, but serves Surabaya, the second largest city in Indonesia. The terminal serves approximately 24 millions of passengers annually or average of 56,440 daily passengers. The research was an exploratory accessibility evaluation of Purabaya Bus Terminal. The rationales were to understand the spectrum of Purabaya Terminal; to understand the inclusive users' needs in Purabaya; to measure the accessibility level of Purabaya Terminal based on the 7 Universal Design. Firstly, Visual Research Method was employed to explore the users' spectrum and collect data for the accessibility evaluation. Later on, analysis and users interview were conducted. The research scopes were limited to passengers-used-areas in the Purabaya Bus Terminal

Normally, the human was categorised as disable and normal persons. But in the research, there are degrees of ability of the users observed. And the spectrum of Purabaya' users were found very unique. In the visual survey in August - September 2011, three passengers' spectrums were found in Purabaya Terminal. The 1st Spectrum was the group of persons with both hands carrying many heavy bags. The 1st Spectrum was not able to reach doors and needed larger movement spaces. The 2nd Spectrum was the group of persons whose one or both hands were free because they were not carrying luggage. The last Spectrum was the group of diffable (disabled) persons. Conclusively, 10% of passengers of 1st Spectrum could be categorised also as diffable because of reaching limitation as well as locomotion.

Purabaya Terminal in General was found inaccessible by the Petra Christian University Team because it failed to fulfil Principle 1. Equitable Use; Principle 2. Flexibility in Use; Principle 5. Tolerance for Error; Principle 6. Low Physical Effort; and Principle 7. Size and Space for Approach and Use. On the other hand, some respondents considered it to be accessible. This was caused by the adaptation of passengers and the behaviour of travelling in group.

Keywords:
Accessibility, Inclusive Design, User Spectrum, Bus Terminal.

INTRODUCTION

The growing aging population in the World created awareness of accessible facilities for users with various abilities (Nasar,J.L., Evans-Cowley,J. ed.,2007).[1] Therefore, better inclusive planning and design of streets, paths, public spaces, and transportation systems are needed. Bus is the most chosen short-and-medium-distance transportation for Indonesian because of its affordable price and flexible timetable. Unfortunately most bus terminals are not accessible even though Indonesian Government had ratified the UN's Convention on the Rights of Persons with Disabilities in 2006, in the Act No. 19 of 2011 and gazetted Act No. 4 of 1997, Government Regulation No. 43 Year 1998, Technical Guidance Facilities and Accessibility in Building and Environment (Regulation of the Minister of Public Works No. 30/PRT/M/2006) [2] This is the rationale of this particular research.

Universal design or inclusive design is the solution to the accessible transportation. It involved more than fulfilling access codes and standards, but designing environments for wider range users comfortably (Nasar,J.L., Evans-Cowley,J. ed..,2007).[3] Universal Design could be defined as a broad-spectrum architectural planning ideas meant to produce buildings, products and environments that are inherently accessible to both the able-bodied and the physically disabled. It was emerged from slightly earlier "barrier-free" concepts, the broader

accessibility movement, and adaptive and assistive technology (http://en.wikipedia.org/wiki/Universal_design).[4] The implementation of universal principles, such as: equitable use, flexibility in use, simple and intuitive use, perceptible information, tolerance for error, low physical efforts, and size and shape for approach and use, would improve liveability and quality of life for everyone (Preiser, W., Ostroff, E., eds., 2001).[5]

Unfortunately, many sepctrum of users are not facilitated in the universal design. And Inclusive design could be a better answer to the problem. It is defined as "The design of mainstream products and/or services that are accessible to, and usable by, as many people as reasonably possible without the need for special adaptation or specialised design." Inclusive design should be embedded within the design and development process, resulting in better designed mainstream products that are desirable to own and satisfying to use (The British Standards Institute, 2005, quoted in http://www-edc.eng.cam.ac.uk/betterdesign/).[6] The users' involvement in the design process becomes crucial. This is relevant to the principles of the inclusive design such as: user centred, population awareness and business focused. A successful implementation of inclusive design can result in a product that is functional, usable, desirable, and ultimately profitable (http://www-edc.eng.cam.ac.uk/betterdesign/).[7]

PURABAYA BUS TERMINAL

Purabaya Bus Terminal, is located in Waru, Sidoarjo, but serves Surabaya, the second largest city in Indonesia. The bus terminal plays an important role in Regional transportation mode (inter-city inter-provinces and inter-city within the province). The terminal comprised of ± 12 ha areas as described in Figure 1 and was built replacing the Joyoboyo Terminal in Surabaya because of land limitation. This terminal was planned since 1982, constructed in 1989 and fully operated in 1991. The terminal serves approximately 24 millions of passengers annually or average of 56,440 daily passengers and it shows the importance of Purabaya. Table 1 would explain more on the Purabaya's passengers trend.

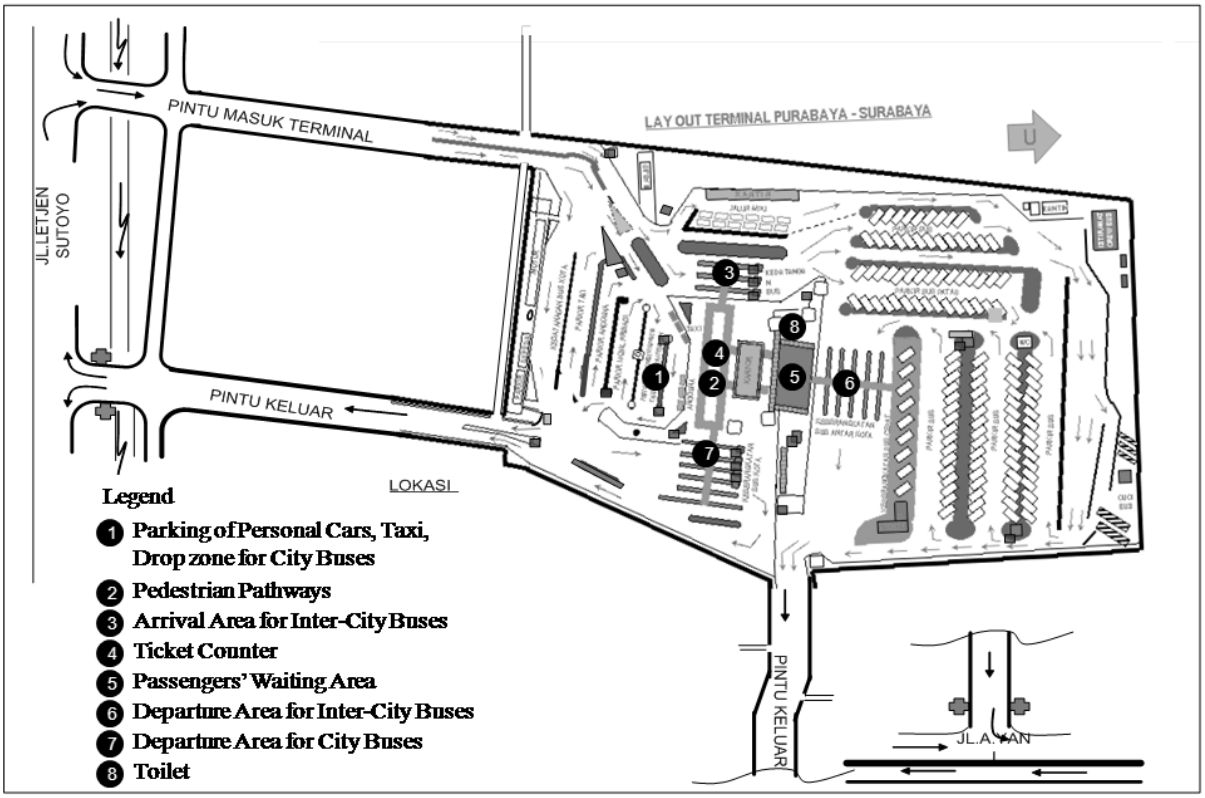

FIGURE 1. Master Plan of Purabaya Terminal
Source: (Transportation Section of Surabaya Municipality, 2009). [8]

TABLE 1. Monthly Purabaya Terminal Passengers in 2011.
Source: (Transportation Section of Surabaya Municipality (2011), The Arrival/ Departure Data of Bus and Passengers in Purabaya Terminal). [9]

		Numbers of Inter-city within the province Passengers		Numbers of Inter-city in the Inter-provinces Passengers		Total Purabaya's Passengers		
Months	Holiday	Arrival	Departure	Arrival	Departure	Arrival	Departure	Total
January	New Year	603.363	656.534	181.774	207.790	785.137	864.324	1.649.461
February		486.675	553.306	195.391	226.624	682.066	779.930	1.461.996
March		554.738	625.299	198.556	250.594	753.294	875.893	1.629.187
April		535.913	621.958	209.935	252.838	745.848	874.796	1.620.644
May		555.535	525.650	209.195	260.610	764.730	786.260	1.550.990
June		644.466	657.040	186.483	248.654	830.949	905.694	1.736.643
July		645.380	721.400	217.063	282.727	862.443	1.004.127	1.866.570
August	Idul Fitri	615.691	745.492	227.658	275.063	843.349	1.020.555	1.863.904
September	Idul Fitri	809.145	714.405	296.084	273.085	1.105.229	987.490	2.092.719
October		537.784	563.611	195.488	235.825	733.272	799.436	1.532.708
November		557.288	698.223	228.315	280.077	785.603	978.300	1.763.903
December	Christmas and End Year Holiday	573.965	718.072	262.088	324.223	836.053	1.042.295	1.878.348

The users' spectrum of the terminal was found unique because of the unique socio – cultural pattern in Indonesia. The close relationship of Indonesians encouraged Indonesians to meet regularly, especially in Eid al-Fitr (*Idul Fitri*) celebration. This important event was recorded by the Transportation Department of Republic of Indonesia. The Department stated that the national *Idul Fitri* migration in 2011 was done by 14.3 millions of Indonesian (Transportation Department of Republic of Indonesia, 2011).[10] Therefore, the inclusiveness of the Terminals was really essential because of large numbers of passengers and wide users' spectrum.

The research was an exploratory accessibility evaluation of Purabaya Bus Terminal. The rationales were to understand the spectrum of Purabaya Terminal; to understand the inclusive users' needs in Purabaya; to measure the accessibility level of Purabaya Terminal based on the 7 Universal Design.

Firstly, Visual Research Method (Sanoff, H., 1991) [11] was employed to explore the users' spectrum and collect data for the accessibility evaluation. Later on, analysis and users interview were conducted. The research scopes were limited to passengers-used-areas in the Purabaya Bus Terminal such as: Parking of personal cars, taxi, and drop zone for city buses, Pedestrian pathways, Arrival area for inter-city buses, Ticket counter, Passengers' waiting areas, Departure area for inter-city buses, Departure area for city buses and Toilet.

RESULTS

USERS' SPECTRUM OF PURABAYA TERMINAL

The formulated research questions were: What spectrums of Purabaya Bus' passengers were present? How was the level of accessibility of the arrival and departure areas Purabaya Terminal according to the Seven Principles of Universal or Inclusive Design? What was the users' comment of the Purabaya Bus' accessibility?

Normally, the human was categorised as disable and normal persons. But in the research, there are degrees of ability of the users observed. And the spectrum of Purabaya' users were found very unique. In the visual survey in August - September 2011, three passengers' spectrums were found in Purabaya Terminal. The 1st Spectrum was the group of persons with both hands carrying many heavy bags. The 1st Spectrum was not able to reach doors and needed larger movement spaces. The 2nd Spectrum was the group of persons whose one or both hands were free because they were not carrying luggage. The last Spectrum was the group of diffable (disabled) persons. Furthermore, a quantitative survey was conducted in August 2012 showing composition in Table 2 and 3.

TABLE 2.Spectrum of Purabaya Terminal in Arrival Gate for 1 hour

Observation Date		6/8/2012									
Time:		Hour		Minutes							
	From	13		45							
	To	14		15							
Position:		Arrival Area for Inter-City Buses									
Users Spectrum		Men				Women				Total	
		Men, 2 hands carrying luggage		Men, 1 hand carrying luggage or both hands free		Women, 2 hands carrying luggage		Women, 1 hand carrying luggage or both hands free			
Normal	Children	1	0.2%	12	2.7%	0	0.0%	9	2.0%	22	4.9%
	Teenagers and Adults	15	3.4%	261	58.5%	18	4.0%	86	19.3%	380	85.2%
	Senior Citizen	2	0.4%	21	4.7%	7	1.6%	14	3.1%	44	9.9%
Diffable (disabled)	Blind									0	0.0%
	Diffable Persons with crutch									0	0.0%
	Diffable Persons with wheelchairs									0	0.0%
	Other Diffable									0	0.0%
Total										446	
	1st Spectrum	43	9.6%		2nd Spectrum	403	90.4%		3rd Spectrum	0	0.0%

Notes:
1st Spectrum (the group of persons with both hands carrying many heavy bags)
2nd Spectrum (the group of persons that one or both hands were free because they were not carrying luggage)
3rd Spectrum (the group of diffable / disabled persons)

TABLE 3. Spectrum of Purabaya Terminal in Departure Gate for 1 hour

Observation Date		6/8/2012									
Time:		Hour		Minutes							
	From	13		10							
	To	13		40							
Position:		Departure Area for Inter-City Buses (Gate)									
Users Spectrum		Men				Women				Total	
		Men, 2 hands carrying luggage		Men, 1 hand carrying luggage or both hands free		Women, 2 hands carrying luggage		Women, 1 hand carrying luggage or both hands free			
Normal	Children	0	0.0%	25	3.6%	2	0.3%	21	3.0%	48	6.8%
	Teenagers and Adults	50	7.1%	359	51.2%	39	5.6%	127	18.1%	575	82.0%
	Senior Citizen	5	0.7%	37	5.3%	15	2.1%	21	3.0%	78	11.1%
Diffable (disabled)	Blind									0	0.0%
	Diffable Persons with crutch									0	0.0%
	Diffable Persons with wheelchairs									0	0.0%
	Other Diffable									0	0.0%
Total											701
	1st Spectrum	111	15.8%		2nd Spectrum	590	84.2%		3rd Spectrum	0	0.0%

Notes:
1st Spectrum (the group of persons with both hands carrying many heavy bags)
2nd Spectrum (the group of persons that one or both hands were because they were not carrying luggage)
3rd Spectrum (the group of diffable / disabled persons)

Table 2 and Table 3 showed the present of 9.8-15.8% of the 1st Spectrum passengers. The 1st Spectrum was the group of persons with both hands carrying many heavy bags. They could face difficulty to move because of their limited reaching capacity to reach doors, to buy tickets, to go to toilets. They also needed larger movement spaces. Secondly, 84.2-90.2% of 2nd Spectrum passengers were identified. They faced least accessible problem because they still could use at least one hand to reach doors, etc. Lastly, 0% of 3rd Spectrum passengers were found during the 2012 survey. It can be concluded that generally 10% of users that would find the terminal less accessible because of their reaching limitation. Meanwhile, low number of diffable (disabled) person in the Terminal showed the less accessible terminal limited them to be present in the terminal. Meanwhile, in September 2011, three diffable (disabled) persons were found. Some examples of 1st Spectrum, 2nd Spectrum and 3rd Spectrum found were described in Figure 2 to Figure 12.

1st Spectrum (the group of persons with both hands carrying many heavy bags)

FIGURE 2. Senior passengers carried sacks of stuffs

FIGURE 3. Adult passengers carried 1 wheeled luggage, 1 cardboard and 1 backpack

FIGURE 4. Adult passengers carried 1 backpack and held 2 kids

FIGURE 5. Adult passengers carried 1 shoulder bag, 1 hand carry bag and held 1 baby

2nd Spectrum (the group of persons that one or both hands were free because they were not carrying luggage)

FIGURE 6. Teenage passengers carried 1 backpack, 1 cardboard, and 1 hand free

FIGURE 7. Teenage passengers carried 1 cardboard and 1 hand free

FIGURE 8. Adult passengers carried 1 hand bag and 1 hand free

FIGURE 9. Adult passengers carried 1 backpack but both hands free

3rd Spectrum (the group of diffable / disabled persons) observed during other survey time

FIGURE 10. Senior Diffable walking with sticks

FIGURE 11. Senior Diffable walking with sticks

FIGURE 12. Adult Diffable walking with crutch

It can be concluded that, on average 10% of passengers at Purabaya could be categorised as finding difficulty to access the Terminal because of reaching limitation as well as locomotion.

ACCESSIBILITY OF PURABAYA TERMINAL

The accessibility level of Parking of personal cars, taxi, and drop zone for city buses, Pedestrian pathways, Arrival area for inter-city buses, Departure area for inter-city buses, Departure area for city buses and Toilet were found low based on 7 Inclusive Design Principles (Preiser, W., Ostroff, E., eds., 2001) [12]. Meanwhile, the Ticket counter and Passengers' waiting areas were accessible. The evaluation could be seen in the following explanations.

TABLE 4. Accessibility Evaluation of Purabaya Terminal based on 7 Universal or Inclusive Design Principles.

No	Areas	Principle 1. Equitable Use; Principle 2. Flexibility in Use; Principle 7. Size and Space for Approach and Use	Principle 3. Simple and Intuitive Use; Principle 4. Perceptible Information	Principle 5. Tolerance for Error	Principle 6. Low Physical Effort	Description
1	Parking of personal cars, taxi, and drop zone for city buses	No	Yes	No	No	Discontinuous level of pedestrian and no treatment in the pedestrian - vehicle circulation crossing causing possible traffic accidents, clear information system.
2	Pedestrian pathways	No	Yes	No	No	The pedestrian pathways width were adequate, steep ramps, slippery floor surfaces, steps prohibited passengers accessing the commercial stalls, clear information system.
3	Arrival area for inter-city buses	No	Yes	No	No	Discontinuous level of pedestrian, many ticket sellers harassing the passengers, no treatment in the pedestrian - vehicle circulation crossing causing possible traffic accidents, clear information system.
4	Ticket counter	Yes	Yes	Yes	Yes	Easy to find and accessible
5	Passengers' waiting areas	Yes	Yes	Yes	Yes	Enough space, continuous level of pedestrian, clear information system.
6	Departure area for inter-city buses	No	Yes	No	No	Discontinuous level of pedestrian, no treatment in the pedestrian - vehicle circulation crossing, many ticket sellers harassing the passengers, bus level is too high from the pedestrian, clear information system.
7	Departure area for city buses	No	Yes	No	No	Discontinuous level of pedestrian, no treatment in the pedestrian - vehicle circulation crossing causing possible traffic accidents, no waiting areas provided, clear information system.
8	Toilet.	No	Yes	No	No	Easy to find, not accessible for diffable (disabled), not enough space for bags, slippery floor surface, bags were kept outside without surveillance, clear information system.

The pedestrian pathways connecting indoor areas were comfortable because they were protected by the roof. It was also wide enough for catering large number of passengers and fulfilling Principle 7, Size and Space for

Approach and Use. However, in some areas, there were some ramps that were too steep, stairs and slippery floor materials. Because of that, Principle 5, Tolerance for Error was not achieved. Some stairs were also found prohibiting diffable (disabled) passengers or passengers with wheeled-luggage accessing the commercial stalls and Principle 1, Equitable Use was not fulfilled. Principle 4, Perceptible Information was fulfilled because the information system was found clear because of adequate signage provided. However, some signs were misplaced and limited lighting.

FIGURE 13. Pedestrian Pathways with slippery floor materials

FIGURE 14. Pedestrian Pathways separated by stairs from the commercial areas

FIGURE 15. Inaccessible ramp and slippery floor surfaces

FIGURE 16. Signage on the Pedestrian Pathways

Meanwhile, four areas in the Purabaya Terminal such as: Parking of personal cars, taxi, and drop zone for city buses; Arrival area for inter-city buses; Departure area for inter-city buses; and Departure area for city buses were found not accessible for 1st and 3rd spectrum because discontinuous level of pedestrian caused Principle 1, The Equality Use; Principle 2, Flexibility in Use and Principle 6, Low Physical Effort principles to be unfulfilled. Additional user behaviours reduced the accessibility such as ticket brokers forcing passengers to go to certain buses. Besides that, the pedestrian movement crossed the vehicle circulation causing possible traffic accidents. Moreover, it showed that Principle 5, Tolerance for Error principle also was not obeyed.

The Principle 3, Simple and Intuitive Use and Principle 4, Perceptible Information were fulfilled because of simple layout of the areas and clear information system. Unfortunately, Principle 6, Low Physical Effort was not achieved because of large gap between the bus and the floor, causing difficulty to diffable (disabled), senior citizen, women using traditional kebaya clothes, and children.

FIGURE 17. Pedestrian Path that was unsafe because of crossing the vehicle lanes in Parking area

FIGURE 18. Pedestrian Path that was unsafe because of crossing the vehicle lanes in Parking area

FIGURE 19. The Arrival area for inter-city buses was unsafe because of crossing the vehicle lanes

FIGURE 20. Large gap between the bus and floor, causing difficulty diffable (disabled) , senior citizen, women using traditional kebaya clothes, and children.

FIGURE 21. Departure area for inter-city buses was unsafe because of crossing the vehicle lanes

FIGURE 22. The ticket brokers disrupted the passenger in the Departure area for inter-city buses

Passengers' waiting area was accessible because of continuous level and adequate size, fulfilling Principle 1, Equitable Use; Principle 2, Flexibility in Use and Principle 7, Size and Space for Approach and Use. The area was connected to restrooms, food stalls, lane departure / arrival, through the connecting corridor. Because of that, the area became the most accessible part of the Purabaya Terminal. Information system in the waiting area was also very clear.

FIGURE 23. Passengers' waiting area

FIGURE 24. Doors and Information system in the Passengers' waiting area

Ticket counter was also accessible because of continuous level and adequate size. It fulfilled the Principle 1, Equitable Use; Principle 2, Flexibility in Use and Principle 7, Size and Space for Approach and Use. The area was visible from the departure / arrival areas as well as the parking area. Information system in Ticket counter was very clear, achieving Principle 4, Perceptible Information.

FIGURE 25. Ticket Counter

The Toilet failed to comply with Principle 1, Equitable Use; Principle 2, Flexibility in Use and Principle 7, Size and Space for Approach and Use, because its small size. Some users had to keep bags outside without surveillance. The toilet access was not accessible, prohibited by the stairs. It did not comply with Principle 6, Low Physical Effort. The floor material of the Toilet was slippery, failing to provide safety, as prescribed in Principle 5, Tolerance for Error. On the other hand, the Toilet was easy to find because good signage, complying with the Principle 3, Simple and Intuitive Use and Principle 4, Perceptible Information.

FIGURE 26. Toilet

FIGURE 27. Information about the location of the toilets in the terminal

THE USERS COMMENT TO THE ACCESSIBILITY OF PURABAYA TERMINAL

The users' comment of the accessibility of Purabaya Bus was collected by interviewing 16 passengers (9 male and 7 female) in August 2012. There were 2 sets of question asking the passengers' background and the accessibility of Purabaya Terminal.

TABLE 5. Interviewee Profile

Ages Distribution	Respondents Number/ Percentage		Occupation	Respondents Number/ Percentage		Travelling Purpose	Respondents Number/ Percentage	
< 15 years old (children)	0	0,0%	Traders	1	6,3%	Trading	1	6,3%
15-29 years old (teenagers)	4	25,0%	Students/ University Students	1	6,3%	Working	5	31,3%
30-50 years old (adults)	7	43,8%	Professionals	5	31,3%	Studying	1	6,3%
>50 years old (senior citizen)	5	31,3%	Porter	0	0,0%	Spending Holiday	1	6,3%
			Others	9	56,3%	Others	8	50,0%

TABLE 6. Luggage Types and Carrying Methods

Luggage Types	Respondents Number/ Percentage		Carrying Methods	Respondents Number/ Percentage	
Backpack and Waist Bag	7	43,8%	Carried by him/herself	16	100,0%
Hand Bag, Suitcase, Sack Bag, Plastic Bag	15	93,8%	Assisted by Porter	0	0,0%
Cardboard	3	18,8%			
Wheeled Bag	1	6,3%			
Others	0	0,0%			

TABLE 7. Reason for Travelling with Bus and Number of Travelling Company

Reason for Travelling by Bus	Respondents Number/ Percentage		Number of Travelling Company	Respondents Number/ Percentage	
Cheap ticket	9	56,3%	Alone	10	62,5%
Fast	3	18,8%	With children under 2 years (carried)	0	0,0%
Could carry many bags	0	0,0%	With 3 to 15 years old children	2	12,5%
Safety	0	0,0%	With 15 to 50 years old teenagers or adults	5	31,3%
Others	4	25,0%	With more than 50 years old citizen	0	0,0%

TABLE 8. Use Frequency of the Terminal and Destination

Use Frequency of the Terminal	Respondents Number/ Percentage		Destination	Respondents Number/ Percentage	
First time	0	0,0%	Inter-City in the Province	12	75,0%
Everyday	0	0,0%			
Once per 3 days	2	12,5%	Inter-City Inter-Province	4	25,0%
Once a week	1	6,3%			
Once in two	2	12,5%			
Once a month	6	37,5%			
Once in three months	0	0,0%			
Once in six months	3	18,8%			
Once a year	2	12,5%			
Others	0	0,0%			

Respondents were selected purposively considering age distribution, ability to answer question and willingness to answer the survey. Therefore, the questionnaire would give sample of the existing passengers of Purabaya Terminal.

TABLE 9.The questionnaire refers to the 7 Principles of Inclusive Design

The 7 Principles of Inclusive Design	No	Questions
Principle 1. Equitable Use Principle 2. Flexibility in use Principle 5. Tolerance for Error Principle 7. Size and Space for Approach and Use)	1	Can the Pedestrian pathways be used comfortably (accessible)?
	2	Can the Parking area (Parking of personal cars, taxi, and drop zone for city buses) be used comfortably (accessible)?
	3	Can the Departure area for inter-city buses be used comfortably (accessible)?
	4	Can the Arrival area for inter-city buses be used comfortably (accessible)?
	5	Can the door in Passengers' waiting areas be used comfortably (accessible)?
	6	Can the ramp be used comfortably (accessible)?
	7	Can your Toilet use comfortably (accessible)?
Principle 3. Simple and Intuitive Use Principle 4. Perceptible Information	8	Is the pedestrian path in Terminal Purabaya easy to find?
Principle 5. Tolerance for Error	9	Do you feel safe when walking outdoor between the vehicles (Parking of personal cars, taxi, and drop zone for city buses, Arrival area for inter-city buses, Departure area for inter-city buses, Departure area for city buses)?
Principle 6. Low Physical Effort	10	Are Passengers' waiting areas and Parking area (Parking of personal cars, taxi, and drop zone for city buses) too far from the bus?
	11	Is the level difference between platform and bus door in arrival or departure area too high to step up?

TABLE 10. Passengers Perception on the Accessibility in Purabaya Terminal

No	Evaluation Aspect	Comfortable (Accessible)	Easy to find	Uncomfortable (Inaccessible)							Not easy to find	Dangerous because of possible traffic collition
	Evaluated Area			Inadequate size	Discontinuous level and steep ramp	Slippery floor material	Too Far from entrance	Lack of signage	Disrupted by many ticket sellers harrasing	Too crowded with vehicle		
1	Pedestrian pathways	75.0%	93.8%	0.0%	0.0%	0.0%	0.0%	6.3%	12.5%		6.3%	
2	Parking of personal cars, taxi, and drop zone for city buses	31.3%		0.0%	0.0%	0.0%	6.3%	0.0%	0.0%	6.3%		56.3%
3	Departure area for inter-city buses	81.3%		0.0%	0.0%	0.0%	6.3%	0.0%	0.0%	0.0%		56.3%
4	Arrival area for inter-city buses	81.3%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		56.3%

TABLE 11. Passengers' Perception on the Accessibility of Detail Element in Purabaya Terminal

No	Evaluation Aspect	Com-fortable (A-ccess-ible)	Uncomfortable (Inaccessible)							Other reasons found
	Evaluated Detail Elements		Inadequate size	Difficult to open	Level too high	Slippery floor material	Too Steep	Not visible	Too Far	Unclean water and Toilet
1	Doors in Passengers' waiting areas	50.0%	0.0%	0.0%						
2	Ramp	56.3%				12.5%	6.3%	18.8%		
3	Toilet	56.3%	12.5%			0.0%			0.0%	12.5%
4	Level difference between platform and bus door in arrival or departure area	62.5%			37.5%					

Majority of respondents carried hand bag, suitcases, and plastic bags (93,8%). Majority of passengers travelled alone (62.5%). Meanwhile, 12.5% of passengers went with children from 3 to 15 years old; 31.3% of passengers went with teenagers or adults. The highest frequency of a bus in Purabaya Terminal is 1 x per month (37.5%), while the most common destinations of passengers were inter-city in the province (75.0%).

It was clear that many passengers carried many bags because of trading or annual going home trip. The 1st and 2nd spectrum were found dominant in the interview carrying backpack and waist bag (43,8%), hand bag, suitcase, sack bag, plastic bag (93,8%), cardboard (18,8%), wheeled bag (6,3%). Therefore, the spectrum of Purabaya Bus Terminal was unique because of bringing mostly hand-carried luggage, bags, and cardboard. On the other hand, wider spaces, continuous pedestrian paths, wider doors and proper ramps were needed for their movement.

Unfortunately, the respondents did not find difficulty to use Purabaya Terminal. Parking of personal cars, taxi, and drop zone for city buses was perceived accessible by 31.3% Respondent, while Pedestrian pathways were perceived accessible too by 75.0% respondents. Moreover, Departure area and Arrival area for inter-city buses were considered comfortable enough for 81.3% respondents although it was contradicted to the evaluation results by Petra Christian University team (that Principle 1, Equitable Use; Principle 2, Flexibility in use; Principle 5. Tolerance for Error and Principle 7, Size and Space for Approach and Use were unfulfilled). The results showed the adaptation of passengers and sharing luggage behaviour with their travelling partners.

The pedestrian pathways of Terminal Purabaya were perceived easy to find by the 93.8% respondents. It meant that the overall design of the terminal was quite simple and easy to find (Principles 3, Simple and Intuitive Use). However, 6.3% respondents complained about the ramp area, because of its steepness, slippery and not visible from a distance. It was also correlated to 6.3% respondents carrying wheeled luggage.

The outdoor areas of The Purabaya Terminal were found less safe by 56.3% respondents because of crossing of vehicle and pedestrian pathways (Principle 5, Tolerance for Error). It was caused by the uncontrolled speed of passing vehicles and untreated pedestrian pathways. This was in line to the evaluation results by Petra team.

The distance between Parking and drop zone to the Departure area was considered close enough by 62.5% of respondents (Principle 6, Low Physical Effort). Meanwhile, some detail elements were evaluated such as: Doors in Passengers' waiting areas, Ramp, Toilet and Level difference in arrival or departure areas for buses. These elements were found by most respondents accessible 50.0% to 62.5%. The Doors in Passengers' waiting areas were found accessible because of wide sizes; meanwhile, ramps, toilets, and level difference between platform and bus door in arrival or departure area was acceptable to the respondents.

On the other hand, some respondents found these elements less accessible. The ramp was found inaccessible because of slippery floor material (by 12.5% respondents), too steep (by 6.3% respondents), not visible (by 18.8% respondents). This was actually in line with recommendation of Petra team that the ramp failed to fulfil

the Principle 1, Equitable Use; Principle 2, Flexibility in use; Principle 5. Tolerance for Error and Principle 7, Size and Space for Approach and Use.

The toilet was also found inadequate in size for keeping the bags by 12.5% respondents (Principle 7, Size and Space for Approach and Use). The toilet was also less acceptable because of uncleanness of water and toilet. Lastly, the level difference between platform and bus door in arrival or departure area was too high by 37.5% respondents. It was also in line with Petra team's recommendation.

FIGURE 28. Respondent number 7 who brought many bags

FIGURE 29. Respondent number 14 who brought many bags

CONCLUSION

The spectrum of Purabaya Bus passengers was found very unique. Three passengers' spectrums were found in Purabaya Terminal. The 1st Spectrum was the group of persons with both hands carrying many heavy bags. The 2nd Spectrum was the group of persons whose one or both hands were free because they were not carrying luggage. The 3rd Spectrum was the group of diffable (disabled) persons. The passengers also carried various bags such as backpack and waist bag, hand bag, suitcase, sack bag, plastic bag, cardboard, and wheeled bag. Therefore, wider spaces, continuous pedestrian paths, wider doors and proper ramps were needed for their movement.

Purabaya Terminal in General was found inaccessible by the Petra Christian University Team because it failed to fulfil Principle 1, Equitable Use; Principle 2, Flexibility in Use; Principle 5. Tolerance for Error; Principle 6. Low Physical Effort; and Principle 7, Size and Space for Approach and Use.

On the other hand, some respondents considered it to be accessible. It was predicted that this was caused by the adaptation of passengers and the behaviour of travelling in group. However, still at least 10% of passengers would need more accessible design in Purabaya Terminal.

IMPLICATIONS FOR PRACTICE AND ADVANCEMENT OF RESEARCH

Different social – economy background actually creates different users' spectrum in the Transportation Facility. The Inclusive design not only concerns with diffable (disabled) person, but also with passengers with unique needs. Therefore, users' spectrum analysis and post occupancy evaluation should be conducted in the existing transportation facility to produce the inclusive designs.

REFERENCES

Government of Republic of Indonesia, Act No. 19 of 2011, on the Ratification of Convention on The Rights of Persons with Disabilities [Undang – Undang Republik Indonesia Nomor 19 Tahun 2011 tentang Pengesahan Convention on the Rights of Persons With Disabilities (Konvensi mengenai Hak – Hak Penyandang Disabilitas)].

Government of Republic of Indonesia, Act No. 4 of 1997 on Disabled Person [Undang – Undang Republik Indonesia Nomor 4 Tahun 1997 tentang Penyandang Cacat].

Government of Republic of Indonesia, Government Regulation No. 43 Year 1998, explaining of the Effort to Improve Social Welfare of the Disabled Persons [Peraturan Pemerintah No 43 Tahun 1998, tentang Penjelasan atas Upaya Peningkatan Kesejahteraan Sosial Penyandang Cacat].

Government of Republic of Indonesia, Regulation of the Minister of Public Works No. 30/PRT/M/2006 on Technical Guidance Facilities and Accessibility in Building and Environment [Peraturan Menteri Pekerjaan Umum No. 30/PRT/M/2006 tentang Pedoman Teknis Fasilitas dan Aksesibilitas pada Bangunan Gedung dan Lingkungan].

Nasar,J.L.,Evans-Cowley,J. (Ed).(2007), Universal design and visitability: from accessibility to zoning, National Endowment for the Arts and The John Glenn School of Public Affairs, Columbus, Ohio.

Preiser, W., Ostroff, E., eds, (2001) Universal Design Handbook. McGraw Hill, New York, USA.

Sanoff, H., (1991), Visual Research Methods in Design, Department of Architecture, School of Design and Environment, North Carolina University, Van Nostrand Reinhold, New York.

The British Standards Institute (2005) British Standard 7000-6:2005. Design Management Systems - Managing Inclusive Design quoted in http://www-edc.eng.cam.ac.uk/betterdesign/.

Transportation Department of Republic of Indonesia, (2011), Numbers of Passengers of All Transportation Modes on Idul Fitri Season in 2009 – 2011, accessed in http://www.dephub.go.id/lebaran/?Id=1 [Departemen Perhubungan Republik Indonesia, (2011), Jumlah Penumpang Seluruh Moda pada Masa Angkutan Lebaran Tahun 2009 – 2011, accessed in http://www.dephub.go.id/lebaran/?Id=1].

Transportation Section of Surabaya Municipality, (2009), Presentation for Formal Visit to Purabaya Terminal Technical Operation Unit [Dinas Perhubungan Kota Surabaya (2009), Bahan Presentasi Kunjungan Kerja, UPTD Terminal Purabaya].

Transportation Section of Surabaya Municipality, (2011), The Arrival/ Departure of Bus and Passengers Data in Purabaya Terminal [Dinas Perhubungan Kota Surabaya (2011), Data Kedatangan/ Keberangkatan Bis dan Penumpang di Terminal Purabaya].

http://en.wikipedia.org/wiki/Universal_design

http://www-edc.eng.cam.ac.uk/betterdesign

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[1] Nasar,J.L.,Evans-Cowley,J. (Ed).(2007), Universal design and visitability: from accessibility to zoning, National Endowment for the Arts and The John Glenn School of Public Affairs, Columbus, Ohio.

[2] Government of Republic of Indonesia, Act No. 4 of 1997 on Disabled Person [Undang – Undang Republik Indonesia Nomor 4 Tahun 1997 tentang Penyandang Cacat].

Government of Republic of Indonesia, Act No. 19 of 2011, on the Ratification of Convention on The Rights of Persons with Disabilities [Undang – Undang Republik Indonesia Nomor 19 Tahun 2011 tentang Pengesahan Convention on the Rights of Persons With Disabilities (Konvensi mengenai Hak – Hak Penyandang Disabilitas)].

Government of Republic of Indonesia, Government Regulation No. 43 Year 1998, explaining of the Effort to Improve Social Welfare of the Disabled Persons [Peraturan Pemerintah No 43 Tahun 1998, tentang Penjelasan atas Upaya Peningkatan Kesejahteraan Sosial Penyandang Cacat].

Government of Republic of Indonesia, Regulation of the Minister of Public Works No. 30/PRT/M/2006 on Technical Guidance Facilities and Accessibility in Building and Environment [Peraturan Menteri Pekerjaan Umum No. 30/PRT/M/2006 tentang Pedoman Teknis Fasilitas dan Aksesibilitas pada Bangunan Gedung dan Lingkungan].

[3] Nasar,J.L.,Evans-Cowley,J. (Ed).(2007), Universal Design and Visitability: From Accessibility to Zoning, National Endowment for the Arts and The John Glenn School of Public Affairs, Columbus, Ohio.

[4] http://en.wikipedia.org/wiki/Universal_design.

[5] Preiser, W., Ostroff, E., eds, (2001) Universal Design Handbook. McGraw Hill, New York, USA.

[6] The British Standards Institute (2005) British Standard 7000-6:2005. Design Management Systems - Managing Inclusive Design quoted in http://www-edc.eng.cam.ac.uk/betterdesign/.

[7] http://www-edc.eng.cam.ac.uk/betterdesign/.

[8] Transportation Section of Surabaya Municipality, (2009), Presentation for Formal Visit to Purabaya Terminal Technical Operation Unit [Dinas Perhubungan Kota Surabaya (2009), Bahan Presentasi Kunjungan Kerja, UPTD Terminal Purabaya].

[9] Transportation Section of Surabaya Municipality, (2011), The Arrival/ Departure of Bus and Passengers Data in Purabaya Terminal [Dinas Perhubungan Kota Surabaya (2011), Data Kedatangan/ Keberangkatan Bis dan Penumpang di Terminal Purabaya].

[10] Transportation Department of Republic of Indonesia, (2011), Numbers of Passengers of All Transportation Modes on Idul Fitri Season in 2009 – 2011, accessed in http://www.dephub.go.id/lebaran/?Id=1 [Departemen Perhubungan Republik Indonesia, (2011), Jumlah Penumpang Seluruh Moda pada Masa Angkutan Lebaran Tahun 2009 – 2011, accessed in http://www.dephub.go.id/lebaran/?Id=1].

[11] Sanoff, H., (1991), Visual Research Methods in Design, Department of Architecture, School of Design and Environment, North Carolina University, Van Nostrand Reinhold, New York.

[12] Preiser, W., Ostroff, E., eds, (2001) Universal Design Handbook. McGraw Hill, New York, USA.