

The Effectiveness Of The Utilization Of Pedestrian Bridge (On Perintis Kemerdekaan Road In Makassar City)

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Abstract: The pedestrian bridge (PB) is one of the relatively the safest facilities that makes it easy for pedestrians on urban highways. The construction of the pedestrian bridge becomes one of the recommended forms of urban transport infrastructure to reduce traffic accidents. However, most of the PB not utilized optimally. Therefore, this study aims to analyze the effectiveness of the use of PB and pedestrian interest in using it and the principle of its application to be effective. The research site is focused on trade and education area (PB front Mall Makassar Town Square and front of the Mandai Elementary School of Makassar). The research data comes from survey results and field interviews. The type of these researches are Qualitative and Descriptive Analysis. The results of these researches show that PB in the trade area is quite effective compared to the education area (51.34% PB Mall M'Tos and 31.71% PB Mandai Elementary School). Throughout the PB has not provided convenience users, where the path to the PB is not yet available and wide PB not yet wide enough, especially PB in the trade area, its user dominant carrying goods groceries. The problem with PB in the area of education that is not beneficial effectively is the result of the placement of PB location, the user takes a lot of time to PB. In addition the PB construction structure does not match the anatomy of its users, particularly at the height of the PB steps. The principle of providing PB, should fulfill the standards that can provide convenience, comfort and safety for all users, especially friendly to the elderly and who have physical limitations.

Keywords: Pedestrian Bridge, Effectiveness, Convenience, Safety.

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I. Introduction

The pedestrian bridge (PB) is one of the relatively the safest facilities to facilitate the pedestrian traffic on urban roads. The function of the availability of the main pedestrian bridge is to provide convenience, comfort, safety to its users so that there is no direct encounter between the crossers with the flow of traffic vehicles passing through the road [1].

The Government of Makassar City has provided PB facilities to make it easier for pedestrians to cross safely. However the current condition is felt, the distribution of PB is not functioning optimally. The non-fulfillment of pedestrian needs facilities, both in terms of quality and quantity, creates a problem in urban areas. The development and fulfillment of pedestrian facilities have received priority of major attention compared to other modes of transportation, so pedestrians are in a weak position.

The limited facilities are not enough to make pedestrians prefer to cross the road rather than utilizing the facilities provided PB. It can be seen that access to PB is felt too far, the height of the bridge and the toll road is too steep, the canopy is damaged, the lights are often extinguished and sometimes misused as a place to sit and where street children gather is also prone to crime.

The presence of PB is often only seen as an advertising medium that can provide revenue assets to the Original Local Government Revenue (OLGR). Ironically again, there are other crossing facilities in the form of zebra cross right adjacent to the PB (observation 2018).

The discussion above shows, the existence of the use of pedestrian bridges people have not optimal, where most of the crossers do not use PB. Therefore, it's required an analysis of the phenomenon. This study aims to prepare the principle of the provision of PB which is preceded by analyzing the interest and effectiveness of its users in the PB trading area (Mall M'Tos) and PB education area (Mandai Elementary School).

II. Results And Discussion

Users Pedestrian Bridge (PB)

Based on the survey data, in the trading area (Mall M'Tos) interest in the dominant use of PB on the day of the holidays is 12:00 pm to 17:00 pm, because it is an active area with economic activities in the form of trade and commerce, so the holiday is utilized most people do shopping activities. In the education area (Mandai Elementary School), interest in the use of PB is dominant on weekdays at the end of the week at 11.00 am to 17.00 pm. This is due to coincide with the students go home and the time of worship on Friday in the mosque near the school.

Table 1. Users of PB trading area (Mall M'Tos)

Time	Monday		Friday		Sunday		Total	
	Up PB	Non PB	Up PB	Non PB	Up PB	Non PB	Up PB	Non PB
07-08	22	13	25	17	8	17	55	47
08-09	36	18	32	21	15	14	83	53
09-10	26	31	26	36	46	11	98	78
10-11	26	27	28	29	33	34	87	90
11-12	33	36	33	41	33	79	99	156
12-13	29	34	39	29	58	59	126	122
13-14	77	68	28	17	68	67	173	152
14-15	52	44	47	44	73	73	172	161
15-16	62	61	58	66	86	78	206	205
16-17	85	61	76	65	82	91	243	217
Total	448	393	392	365	502	523	1342	1281
Total Rise PB + Non PB							2623	

Source: Analysis Results, 2018.

Table 2. PB user of education area (Mandai Elementary School)

Time	Wednesday		Friday		Saturday		Total	
	Up PB	Non PB	Up PB	Non PB	Up PB	Non PB	Up PB	Non PB
06-07	12	29	16	17	13	12	41	58
07-08	62	70	47	57	35	58	144	185
08-09	21	67	24	58	10	221	55	346
09-10	30	62	29	56	20	291	79	409
10-11	18	78	18	78	49	306	85	462
11-12	35	68	81	117	27	263	143	448
12-13	69	64	88	77	52	96	209	237
13-14	13	48	45	48	17	99	75	195
14-15	29	51	62	61	13	64	104	176
15-16	51	70	85	61	54	10	190	141
16-17	40	89	37	90	18	50	95	229
Total	380	696	532	720	308	1470	1220	2886
Total Rise PB + Non PB							4106	

Source: Analisis Results, 2018

Analysis of the effectiveness of the use of PB

The effectiveness of the use of pedestrian bridges is calculated based on the number of people crossing the road and number of people using PB [2,3]: as follows.

The formula calculates the effectiveness of using pedestrian bridges (%) = $\frac{A}{B} \times 100\%$

Where:

A = The number of pedestrians who cross over using pedestrian bridges

B = The total number of walkers crossing the street

The value of effectiveness of pedestrian bridges can be classified into 5 categories [2,3]. The classification can be seen in Table 3.

Table 3. Classification of the Effectiveness of Pedestrian Bridge

Effectiveness (%)	Criteria
0 – 20	Very Ineffective
20,1 – 40	Ineffective
40,1 – 60	Effective enough
60,1 – 80	Effective
80,1 - 100	Very effective

In the trade area, the average number of people crossing the road is 2623 person/day, while those using PB are 1342 people/day. Analysis result shows the effectiveness of PB trading area (mall M'Tos) is 51.34%, which value is in the category effective enough. For educational areas, the average number of people crossing the road is 4016 person/day, while those using PB are 1220 people/day. The result shows that the effectiveness of PB of education area (Mandai Elementary School) is 31.71%, which is in the category of ineffective category. The use of PB in trading areas is more effective due to the more varied types of awakening and pulling when compared to the education area.

User Age

This analysis is to find out how far the effectiveness level of age aspect. Table 4 shows the users of the PB trading area (Mall M'Tos) and PB of education (Mandai Elementary School). PB trading area (Mall M'Tos), 559 users dominantly aged 18 to 45 years. This is because the use of land in the area designated as an office area, trade, which is a tug to work and shop or otherwise. For PB education area (Mandai Elementary School), 799 users are dominantly <17 years old, where there are Yayasan Pendidikan Darussalam Makassar and Mandai Elementary School beside PB.

Table 4. PB users by age

Age	PB trading area (Mall M'Tos)						PB education area (Mandai Elementary School)					
	<17 Year old		18 to 45 Years old		>46 Years Old		<17 Years old		18 to 45 Years old		>46 years old	
	n	%	n	%	n	%	n	%	n	%	n	%
Up PB	307	62.78	559	56.41	476	41.64	799	63.82	163	14.98	258	14.61
Non PB	182	37.22	432	43.59	667	58.36	453	36.18	925	85.02	1,508	85.39
Total n	489	100	991	100	1143	100	1,252	100	1,088	100	1,766	100

Source: Analysis Results, 2018

Based on user age analysis, the effectiveness of the use of PB in Table 5 is obtained.

Table 5. Criteria for effectiveness levels based on user age

User Age	PB trading area (Mall M'Tos)		PB education area (Mandai Elementary School)	
	Effectiveness (%)	Criteria	Effectiveness (%)	Criteria
<17 years	62.78	Effective	63.82	Effective
18 to 45 years	56.41	Effective enough	14.98	Very Ineffective
>46 years	41.64	Effective enough	14.61	Very Ineffective

Source: Analysis Results, 2018

Distance

In accordance with Ministry of Public Works Regulation No.03/PRT/M/2014 the maximum distance from the center of activity or the center of the crowd in an area leading to a wade facility in the form of PB shall have a maximum distance of 50 m [4]. The path to the PB should also be easy to reach and safe to pass.

Table 6. Distance of users, who crossed using PB

Distance	PB trading area (Mall M'Tos)						PB education area (Mandai Elementary School)					
	<50 m		51-100m		>101m		<50 m		51-100m		>101m	
	n	%	n	%	n	%	n	%	n	%	n	%
UP PB	1283	53.82	52	29.89	7	10.77	1021	71.75	123	21.13	76	3.62
Non PB	1101	46.18	122	70.11	58	89.23	402	28.25	459	78.87	2025	96.38
Total n	2384	100	174	100	65	100	1423	100	582	100	2101	100

Source: Analysis Results, 2018

PB users in the dominant trading area are <50 cm, due to public transport stop (up and down passengers), as for the crossers without 15m. For PB in education ± using PB due to zebra cross with distance

area is >100 m from the activity center (market, shops, travel, restaurants) so that users prefer to cross directly without using PB. Therefore, based on the analysis, effective use of PB at a distance <50 m in both trade and educational areas in Table 7.

Table 7. The level of effectiveness based on distance

Distance	PB trading area (Mall M'Tos)		PB education area (Mandai Elementary School)	
	Effectiveness (%)	Criteria	Effectiveness (%)	Criteria
<50 m	53.82	Effective enough	71.75	Effective
>51-100 m	29.89	Ineffective	21.13	Very Ineffective
>101m	10.77	Very Ineffective	3.62	Very Ineffective

Source: Analysis Results, 2018

Time

Pedestrians who cross the street use PB and who do not use have different duration of time. In Table 8, PB users require a 5-8 minute travel time to cross and require <5 minutes if crossing directly by crossing the highway.

Table 8. When traveling from the distance of the pedestrian

PB Time	PB trading area (Mall M'Tos)								PB education area (Mandai Elementary School)							
	<5 minutes		5,1 - 8 minutes		> 8,1 minutes		Total		<5 minutes		5,1 - 8 minutes		> 8,1 minutes		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Up PB	1283	95.60	52	3.87	7	0.52	1342	100	1021	83.69	123	10.08	76	6.23	1220	100
Non PB	1281	100	0	0	0	0	1281	100	2886	100	0	0	0	0	2886	100

Source: Analysis Results, 2018

At the PB location of the trading area, 95.60% of users took <5 minutes to use PB and 3.87% of users took 5.1-8 minutes and 0.52% of users took >8.1 minutes. For the PB location of the education area, there are 83.69% of users who take <5 minutes to use PB, 10.08 users takes 5.1-8 minutes and 6.23% of users takes >8.1 minutes. As for all non PB users it only takes <5 minutes to cross across the highway directly. Therefore, based on the results of the analysis, the use of PB is very effective at <5 minutes in both the trade and education areas in Table 9.

Table 9. The level of effectiveness based on time

Distance	PB trading area (Mall M'Tos)		PB education area (Mandai Elementary School)	
	Effectiveness (%)	Criteria	Effectiveness (%)	Criteria
<5 minutes	95.60	Very effective	83.69	Very effective
5.1-8 minutes	3.87	Very Ineffective	10.08	Very Ineffective
>8.1 minutes	0.52	Very Ineffective	6.23	Very Ineffective

Source: Analysis Results, 2018

Analyze the pedestrian interest of PB users

Pedestrians interest in using PB as a wade facility is divided into 3 categories: convenience, comfort, and safety [2,4]. Respondents were determined as many as 40 people in each location of the research object representing pedestrians who do not use PB as a means of doing cross-road activities.

Convenience

In trading areas, rocky path conditions are blocked and blocked by motorized parking, making pedestrian difficult to access the PB and choose to cross the road directly, especially the zebra cross just beside the PB. In educational areas, most wagons are within a distance of >150m, making users feel so far away and accessed by exhausted using the ladder is high enough. The presence of wading guides, adds anxiety to the PB (see in Table 10).

Table 10. Aspects of convenience according to respondents

Indicators	Convenience			
	PB trading area (Mall M'Tos)		PB education area (Mandai Elementary School)	
	n	%	n	%
Condition of pedestrian Lane	21	52.5	3	7.5

High rung	4	10	21	52.5
Other crossing facilities are available	15	37.5	16	40
Total	40	100	40	100

Source: Analysis Results, 2018

Comfort

PB trading area, users feels the inconvenience caused by the width of the bridge that is not large enough, the texture of the floor is rough and mossy, and the roof covering is damaged. While the PB education area, felt quite high and also has a coarse floor texture, so many crossers who do not ride PB (see in Table 11).

Table 11. Pedestrian comfort in using PB

Indicators	Comfort			
	PB trading area (Mall M'Tos)		PB education area (Mandai Elementary School)	
	n	%	n	%
PB High	2	5	24	60
Floor Texture	12	30	13	32.5
PB width	17	42.5	3	7.5
PB Roof	9	22.5	0	0
Total	40	100	40	100

Source: Analysis Results, 2018

Safety

Crossers who do not access PB in both the trade and educational areas say crossing using PB is not the only safety factor in crossing. The presence of other wading facilities in the form of zebra cross and informal *ojek* (driver online), felt quite safe in crossing (see in Table 12).

Table 12. Pedestrian safety

Indicators	Safety			
	PB trading area (Mall M'Tos)		PB education area (Mandai Elementary School)	
	n	%	n	%
Safe with a PB ride	12	30	10	25
Safe by crossing the highway	28	70	30	75
Total	40	100	40	100

Source: Analysis Results, 2018.

III. Conclusion

The PB in trading areas is quite effective than education areas (51.34% PB Malls M'Tos and 31.71% PB Mandai Elementary School). Overall, the two PB has not provided ease and convenience to their users, where the path leading to PB is not yet available and the width of PB is not yet wide enough, especially PB in trading area, its users are dominantly carrying groceries. The problem with PB in the area of education that is not useful is effective resulted from the placement of PB location, the user takes a lot of time towards PB. Other than that PB construction structure does not match the anatomy of its users, especially at the height of step PB. Printing principle of PB, should meet the standards that can provide convenience, comfort and safety for all users, especially friendly to the elderly and who have physical limitations.

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