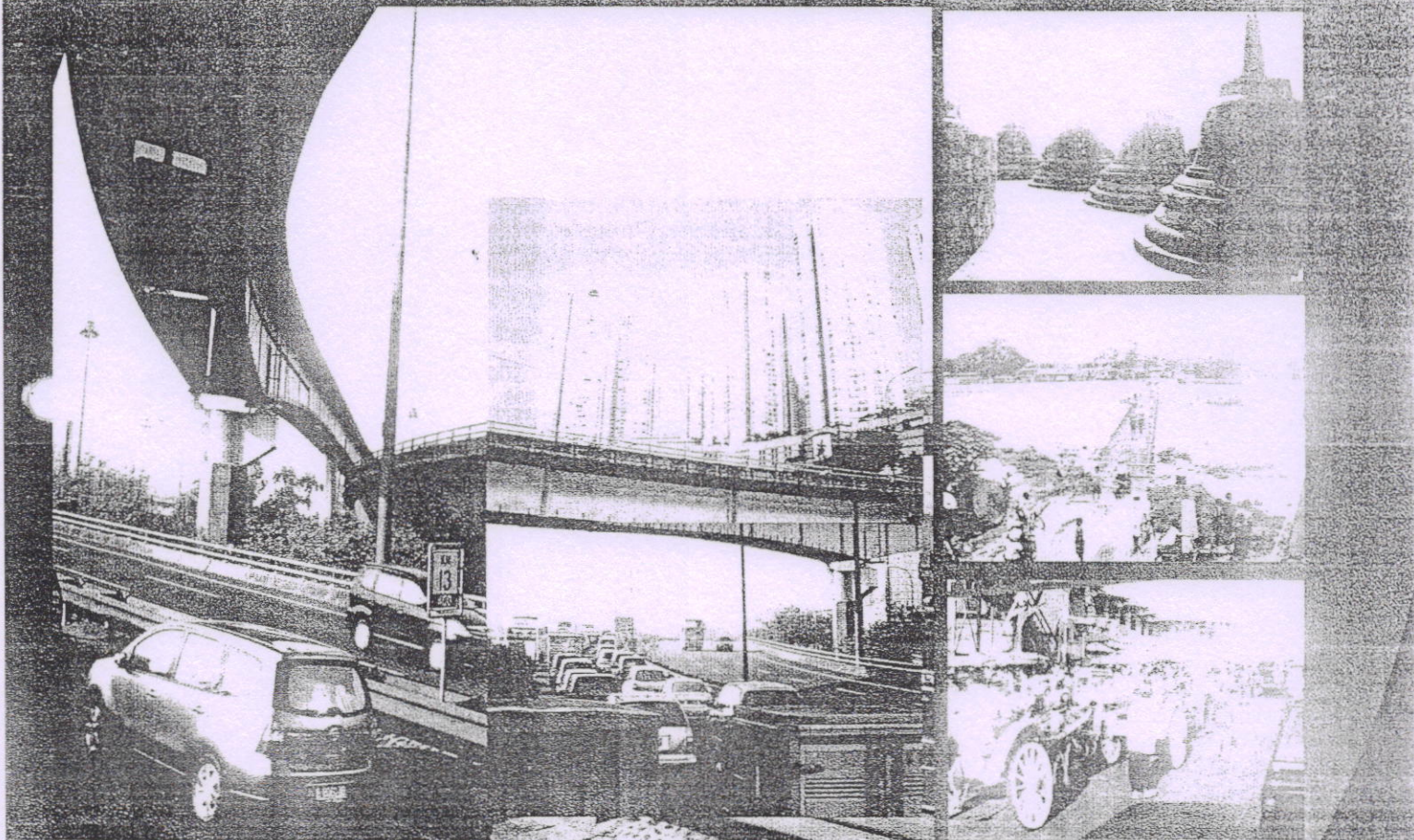*Proceedings of*

THE SEVENTH ASIA PACIFIC CONFERENCE
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3-5 June 2010

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Visitors Preference at Shopping Center Areas regarding Pedestrianization Scenarios

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ABSTRACT

There is a need to improve the quality of pedestrian facilities in many Indonesian urban areas. In order to optimize the quality level of pedestrian facilities, it requires a comprehensive planning which integrate all stakeholders point of view. One important aspect is the users' preference regarding the type of pedestrianization scenarios. This preference is useful for the government before the scenario implementation takes place. When user preferences are similar with the government's idea, the possibility of a success is increasing. The purpose of this study is to analyze the preference of the visitors at shopping centre. Four different types of scenario were provided, i.e. pedestrian lane with one-car-lane, pedestrian lane with two-lanes, pedestrian with no car-lane, and mall concept. The questionnaires were distributed in four places, i.e. Braga, Cihampelas, Dalem Kaum, and Merdeka. Several non-parametric statistical methods were employed to analyze the data. The results of this study show that respondents in each location have different preferences regarding the scenarios. Mall concept seems to be the most preferred scenario according to the respondent in Bandung.

Keywords: Pedestrian, Visitors, Shopping Center, Pedestrianization Scenario

1. INTRODUCTION

The need for movement of both vehicles and pedestrians efficiently and safely at the same location, causes significant challenges for managing traffic. The challenge is to design existing roads to be suitable for the use of vehicle as well as pedestrian. Pedestrian is an important part of road users, as Pline (1999) stated that many road users, who have no other choice but to walk, and at different times all road users are pedestrians.

Pedestrianization in commercial areas or major roads is important for urban revitalization, although it must be applied carefully in order to be effective (West, 1990; Robertson, 1990; Tyler, 1999). Pedestrianization can also help in raising good environment and to attract the residents and visitors (Boyd, 1998). Pedestrian facilities, especially sidewalks, must be able to accommodate many users with various activities. Different user types cause the sidewalks to be designed and managed in such a way that can accommodate all types of users in various conditions (VTPI, 2008). There are several alternatives that may be used, such as changes in sidewalks dimensions or closing the entire street from the vehicle.

Design of the pedestrian facilities intends to increase the quality of pedestrian facilities and to create a comfortable environment. When pedestrian facilities provide some degree of comfort for the user, pedestrian will contributes for shopping centre's success and vitality of city centers. A good pedestrian system will decrease the dependence on vehicle at city centers, increase the visitors, create activities, and improve air quality as well (Djunaedi, 2000).

However, the existing shopping center areas in Bandung have not good quality of pedestrian facility yet. Thus, in order to improve the quality of pedestrian facilities, it needs some actions to promote the use of pedestrian facilities by implementing transportation scenarios, i.e. designing a concept of

pedestrianization. There are many varieties of concepts of pedestrianization which have a great success in many countries, especially in city centers in developed countries like Europe. As it is believed there is different situation and need between users in developed and developing countries, thus it is argued there are different preference regarding concept of pedestrianization.

The aim of this study is to analyze the visitor's preference in the shopping center areas regarding the alternatives of pedestrianization scenario. Analysis will also compare the preferences among these city centers. Four locations are selected as a place to distribute the questionnaire, i.e. Braga, Cihampelas, Dalem Kaum, and Merdeka, Detail explanation regarding this study can be found in Adipratama (2010) and Joewono (2009).

The structure of this article is as follows. Brief discussion regarding pedestrian is provided in section two after this introduction. Study method and description of collected respondents are available in section three. Section four describes data analysis. Last section concludes this study.

2. **PEDESTRIAN FACILITIES**

Activities in public roads can be classified into three types. The first one is a non-movement for pedestrians (non-pedestrian) which consists of the movement of wheeled or motorized vehicles. Another activity is the movement of pedestrians. Pedestrian movement is pedestrian dynamic activities, such as running or walking. Static pedestrian activity is covering up the activities, leaned, sitting, squatting, or lying down (Untermann, 1984).

Streets for pedestrians (Pedestrian Street) sometimes called the pedestrian malls or pedestrian zone. Basically pedestrian street is an area reserved for pedestrians, and created to facilitate the activities of pedestrians, so there is limited access for motorized vehicles (Priyanto, 2004). To define the street as a pedestrian area (pedestrian street), Untermann (1984) emphasizes the function of pedestrian areas as a street where pedestrians are given greater rights than motor vehicles.

Pedestrian facilities include sidewalks, waiting shanties, street lamps, railings, street markers, and a shade or protection. Pedestrian facilities are provided with the following criterias (Ministry of Public Work, 1999):
1. Pedestrian path is provided in places where the presence of pedestrians had caused a conflict with vehicle traffic or interfere with other designated, such as parks. If it intersects with vehicle traffic lane, then the lane should be equipped with signs, markers, or lighting a warning or guidance states for road users. Pedestrian corridor (in addition to the tunnel) has a free visibility in all directions. Technical specification of lanes width should be planned and designated with consideration to persons with disabilities.
2. Shanties should be provided in the median road.
3. Lamps are placed on tracks crossing the roads. The lighting should be bright enough so that the other road users can see the pedestrian when they are crossing, either in daytime or night. Lamps should not give an excessive glare to the vehicle users.
4. Sign placement and dimensions should comply with sign specifications. Types of signs should be selected to be suitable with the needs and circumstances.
5. Guardrail is required if the volume of pedestrians in one direction of the road is more than 450 people/ hour/effective wide (in meters), the volume of vehicles is more than 500 vehicles/hour, and if the vehicle speed is over 40 km/hour. Barrier materials can be made of bricks or plants.
6. Street markers are only placed on crossing points. The presence of markers should be easily visible and clearly to the road users, both during daytime or night. Installation of markers must be permanent and non-slippery for road users.
7. Type of shelter or protection should comply with pedestrian types, namely protection of trees or roof.

The sidewalks are part of the public rights that provide areas for people who travel on foot (ALRC, 2009). The existence of pedestrian facilities, such as sidewalks, aims to create a proper facility for the user to walk and improve pedestrian safety. Sloping lines provide access between the sidewalk and the street for people who use wheelchairs, walking sticks, bicycles, and pedestrians who have a problem when running with high elevation of the sidewalk. Crossing signs, such as the zebra cross, aim to warn users of motor vehicles on the pedestrian crossing, and indicates the location for the crossing. Lighting, public transport stops, pedestrian bridge, and complement the sidewalk are also parts of the pedestrian facility (ALRC, 2009).

Furthermore, besides the availability of facilities, pedestrian street should be supported by a proper and suitable pedestrian strategy. The purpose of pedestrian strategy is to run pedestrian facilities as a part of urban elements, and as a health and recreational assets. Pedestrian strategy gives focus on walking, land use, and quality of travel (Gardner et al., 1996).

The main issue is the design of pedestrian street that should make a balance between pedestrians and vehicles. In addition, pedestrian safety is also a major issue. As a matter of fact, in Indonesia and also in several other developing countries (e.g. Thailand), pedestrian streets are often associated with problems of informal sector traders, i.e. street vendors (Djunaedi, 2000). Thing needs to be considered in the creation of pedestrian areas is that these areas should provide opportunities for pedestrians to develop interest in socialization, recreation, and freedom. This requires a sense of security, comfort, and ease of access (Priyanto, 2004). Although pedestrians have priority, but the area for pedestrians does not have to be free of vehicles. Pedestrian areas can be created through various means, such as physical design or implementation of traffic regulations (Priyanto, 2004).

3. DATA DESCRIPTION

3.1 Method of Study

To collect responses from visitors of shopping center areas in Bandung, a questionnaire survey was conducted. Respondents were randomly selected from four locations, i.e. Braga, Cihampelas, Dalem Kaum, and Merdeka. Questionnaires were distributed from 31 October up to 4 November 2009, both weekend and weekday. A total 1400 set of questionnaires were distributed.

The questionnaire consists of several parts, i.e. socio-demographic, travel activity, and preference regarding scenarios of pedestrian strategy. The scenarios were provided as a stated preference like question. Respondents were asked to compare current condition of pedestrian facility in shopping center with "the stated pedestrianization scenario" offered. Figure 1 provides typical stated question in the distributed questionnaire to the visitors in shopping center areas.

There were four stated scenarios, which those scenarios were compared to the existing conditions of pedestrian facility in the area of shopping centers. Existing situations were explained by condition where vehicle were allowed to park along the street, traffic congestion exists, mix traffic between pedestrian, vehicle, and street vendors. As alternatives, four scenarios were provided as follows:
1. Pedestrian lane with one-car-lane; sidewalk located in this road was widened, only one lane for vehicle traffic, and vehicle can not park along the street.
2. Pedestrian lane with two-car-lanes; sidewalk in this road was widened, two lanes for vehicles traffic, and vehicles can not park along the street.
3. Pedestrian lane with no-car-lane; whole street was dedicated for pedestrian, while vehicle traffic will be flowed to other routes.
4. Mall concept; entire segment of the road was closed from vehicle traffic, all path was dedicated for pedestrian only, and a wide space was provided for street vendor.

Pedestrian Lane With One-car Lane

Pedestrian Lane With Two-car Lane

Pedestrian Lane With No-car Lane

Mall Concept
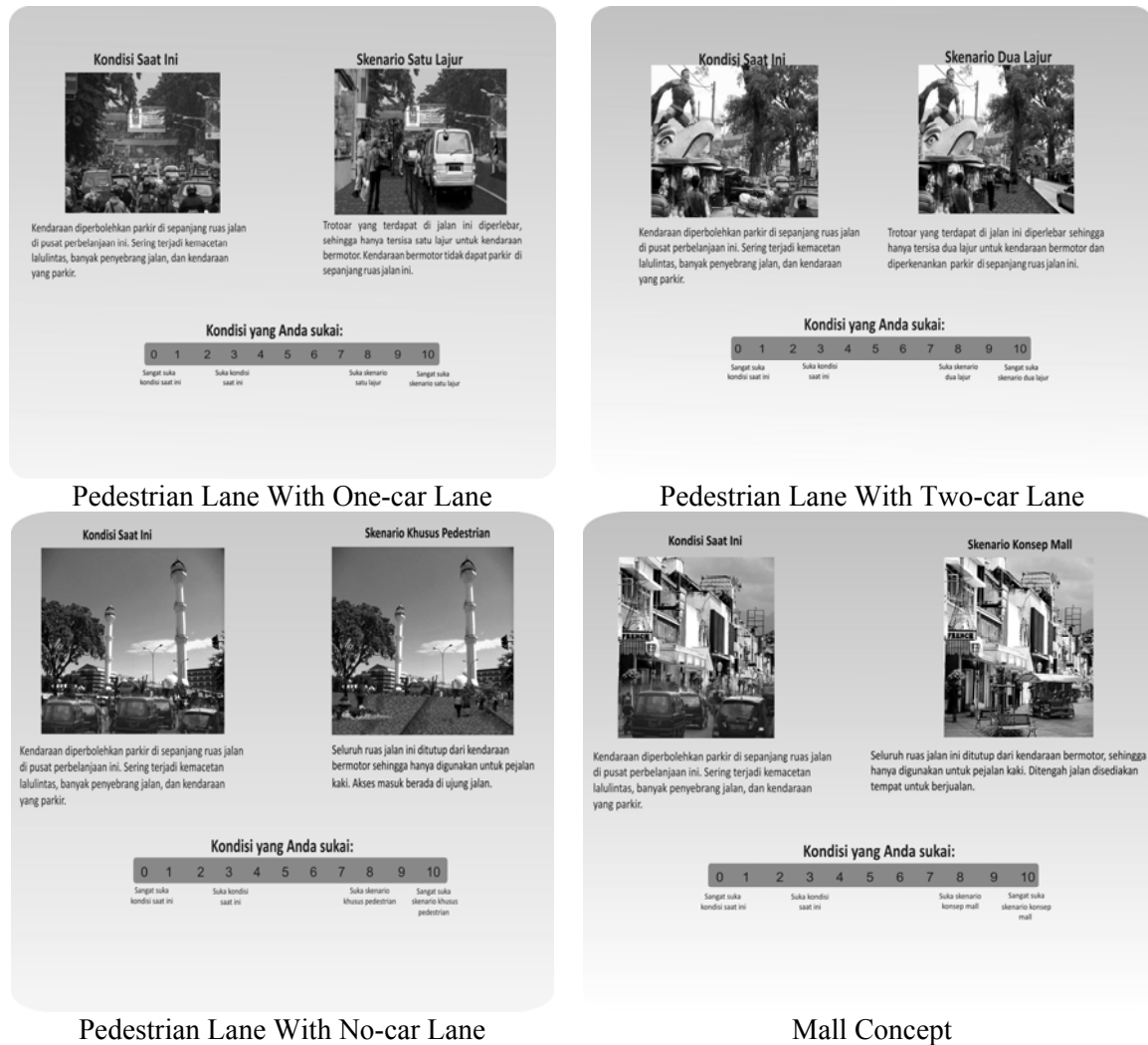
Figure 1: Typical Stated Question

3.2 Locations of Study

There are four locations selected as a place to distribute questionnaire in this study. The first area is Braga area. Braga area exists more than a hundred years ago. Since its beginning, this area has a big attraction as a place for pleasure, dine, and shopping. Until today, this area is still able to attract visitor, even not optimal yet. The street length is 854 meters and 9 meters wide. Sidewalk in this area has 2.8 meters width, where exists alongside the street (Bina Marga, 2009).

The second area is Cihampelas road. This area can be categorized as one of the most famous place in Bandung. As a center for shopping place, especially jeans' fashion, this area attracts visitor not just people who reside in Bandung but visitor from other city in Indonesia even abroad, like Malaysia. On the left side of the road there is almost no sidewalk, unlike the right side of the road. Cihampelas road has a length as much as 2550 meters and 7 meters width (Bina Marga, 2009).

Merdeka road, as the third study location, is located in the center of the city of Bandung. Alongside this arterial street, there are many buildings, activities, shops, and restaurants among others, which provide many attractions for visitors to come. Merdeka road has a length 1065 meters and 12 meters width (Bina Marga, 2009). There is uniqueness in this area, where alongside the sidewalk, a railing is available acts as a guardrail for pedestrians. The use of such guardrail is considered less effective,

because the existing sidewalk on the road is used by street vendors, so the space for pedestrians becomes narrower.

The last study location is Dalem Kaum. This area has a long history, as this area is the capital of the regency of Bandung in the beginning of this city. At present, there are so many shops as well as shopping centers. At daytime, this area is famous as one of the place in Bandung with high concentration of activity and creates congestion as well. The length of road in Dalem Kaum 833 meters and has a width between 12 up to 18.5 meters (Bina Marga, 2009).

3.3 Respondent Characteristics

The proportion of the age of respondent who used pedestrian facility appears in Table 1. The largest proportion of visitors in these areas is visitors with 17 to 29 years, with more than 50%. It shows that the majority of visitors are young people.

Table 1: Description of Respondent Age

Age	Proportion (%)			
	Braga	Cihampelas	Dalem Kaum	Merdeka
17 or younger	15.43	15.43	10.86	12.57
17-29	64.00	61.14	59.43	66.86
30-39	9.71	14.29	20.57	13.14
40-49	9.71	6.29	7.43	5.71
50-65	1.14	2.29	1.14	0.57
65 or older	0.00	0.57	0.00	0.57

From the point of view of gender, the largest proportion of respondent is male. The largest proportion of male respondents can be found in Cihampelas area (65.14%), while the largest proportion of female respondents exists in Merdeka area (45.71%). The distributions of respondent based on gender are provided in Figure 2.
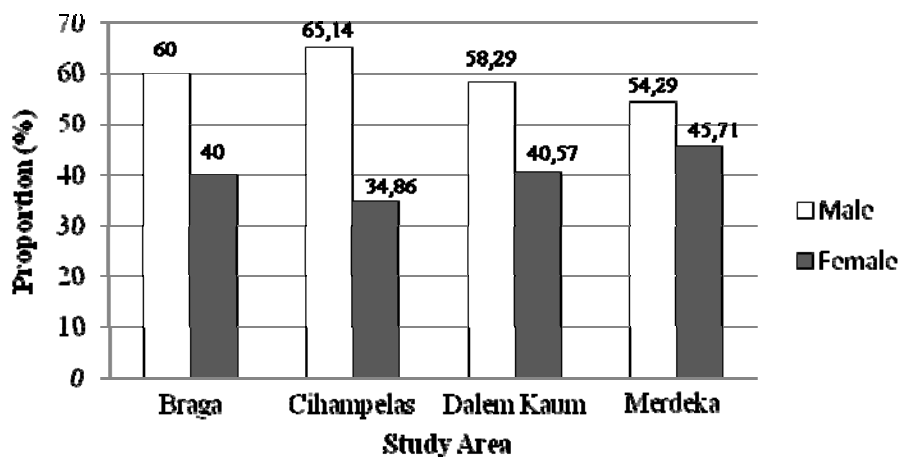

Figure 2: Gender of the Respondent

4. DATA ANALYSIS

4.1 Relationship between Scenarios and Respondent Characteristics

In order to know whether there is relationship between scenario and respondent characteristics, a cross-classification analysis was conducted. Based on the cross-classification table, an analysis using test of independence can be performed. Three characteristics were explored in this study, i.e. age, gender, and monthly income. Hypotheses in the test of independence are:

H_o: Pedestrianization scenario and respondent characteristics are independent
H_1: Pedestrianization scenario and respondent characteristics are not-independent

Table 2 provides the results of the test. It can be seen that the scenario of pedestrian lane with one-car-lane has relationship with age in the area of Merdeka. Pedestrian lane with two-car-lanes has a relationship with age in Cihampelas and Merdeka. Scenario of pedestrian with no-car-lane is influenced by age in Cihampelas only.

Table 2: Results of Test of Independence between Scenarios and Age

Scenarios	Hypotheses	p-value			
		Braga	Cihampelas	Dalem Kaum	Merdeka
Pedestrian lane with one-car-lane		0.336	0.193	0.899	0.000
Pedestrian lane with two-lanes	H_0: Scenario and respondents age are not related	0.925	0.000	0.821	0.026
Pedestrian with no car-lane	H_1: Scenario and respondents age are related	0.376	0.000	0.519	0.895
Mall concept		0.053	0.666	0.603	0.892

Further analysis is completed to test the relationship between scenario and gender. Table 3 shows the results. It can be found that all scenarios are independent with gender. It can be summarized that user preferences regarding scenario of pedestrian strategy can be generalized among gender.

Table 3: Results of Test of Independence between Scenarios and Gender

Scenarios	Hypotheses	p-value			
		Braga	Cihampelas	Dalem Kaum	Merdeka
Pedestrian lane with one-car-lane		0.144	0.360	0.239	0.612
Pedestrian lane with two-lanes	H_0: Scenario and respondents gender are not related	0.191	0.099	0.078	0.002
Pedestrian with no car-lane	H_1: Scenario and respondents gender are related	0.243	0.766	0.390	0.542
Mall concept		0.196	0.664	0.605	0.349

Similar result appears in Table 4 to show the results of the relationship between scenario and monthly income. All scenarios are independent with monthly income. It can also be concluded that user preferences are independent with monthly income.

Table 4: Results of Test of Independence between Scenarios and Monthly Income

Scenarios	Hypotheses	p-value			
		Braga	Cihampelas	Dalem Kaum	Merdeka
Pedestrian lane with one-car-lane		0.901	0.195	0.068	0.613
Pedestrian lane with two-lanes	H_0: Scenario and respondents monthly income are not related	0.748	0.203	0.172	0.819
Pedestrian with no car-lane	H_1: Scenario and respondents monthly income are related	0.589	0.732	0.002	0.550
Mall concept		0.096	0.848	0.569	0.978

4.2 Comparisons among Scenarios

Further analysis is to know whether there are different preferences regarding the scenario in each location. To test the hypothesis, the Friedman method is applied. The hypotheses are:

H_o: There are no different among scenarios.
H_1: At least one among scenario is different

The results of the tests are provided Table 5. Using level of significance as much as 0.05, it can be inferred that in Dalem Kaum and Merdeka, the scenarios are rated as different. It means visitors in those both areas have different preference with the scenario. On the contrary, visitors in Braga and Cihampelas do not care so much with a specific scenario.

Table 5: Preference Comparisons in each Location using Friedman Method

Location	F_r	d.f.	p-value	Ho rejected
Braga	4.801	3	0.187	Yes
Cihampelas	2.465	3	0.482	Yes
Dalem Kaum	21.310	3	0.000	Yes
Merdeka	42.937	3	0.000	Yes

Moreover, an analysis to investigate whether there are different preferences among study location is also conducted. It is useful to know whether visitors in one place have a preference with a specific scenario. The hypotheses in this test are:

H_o: There are no different of preference among location.
H_1: At least one location has different preference.

Kruskal-Wallis method is applied in this test. The results are presented in Table 6. It can be seen that the null-hypothesis is rejected for all scenarios. It means visitors in each location have different preference regarding a specific scenario. People in one place show different perception with people in other place about the scenario.

Table 6: Preference Comparisons among Location using Kruskall-Wallis Method

Scenarios	W	d.f.	p-value	Ho rejected
Pedestrian lane with one-car-lane	114.0757	3	0.000	Yes
Pedestrian lane with two-lanes	72.1952	3	0.000	Yes
Pedestrian with no car-lane	98.1552	3	0.000	Yes
Mall concept	77.0501	3	0.000	Yes

As previous test show that there are different perception regarding each scenario, thus it is needed to test the rank of preference. It is useful to show which scenario is preferred the most. The test applied in this stage is Page Test methods. More detail explanation regarding this test can be found in Conover (1999). This test is performed to determine the priority of visitor preferences in each location of the four scenarios.

Table 7 is the results of calculation using Test Page analysis. Z values are compared with the z-table to determine the rejection of the null hypotheses. L value is the value of the smallest number of rank (R1) to the number of the largest ranking value (R4).

Table 8 shows the final analysis to test the rank in each location. The results of analysis using Braga's dataset shows that respondents give more attention to mall concept's scenario, then followed with a two-car-lane, one-car-lane, and no-car-lane. The result of analysis using dataset from Cihampelas shows scenario of mall concept has the highest priority. The visitors at Dalem Kaum street are also prefer the mall concept, followed by no-car-lane, one-car-lane, and two-car-lane scenario. Analysis for Merdeka's dataset shows a similar result with Cihampelas. Visitors in both location prefers mall concept in the first degree, while it is followed by no-car-lane, two-car-lane, and o one-car-lane.

Table 7: Results of Page Test Calculation

Study Area	R_1	R_2	R_3	R_4	L	z	z-table
Braga	411,080	419,680	436,880	450,640	4363,640	-84,762	-1,645
Cihampelas	412,360	415,740	430,950	430,950	4260,490	-84,201	-1,645
Dalem Kaum	401,850	415,530	424,080	468,540	4379,310	-84,245	-1,645
Merdeka	392,710	408,280	437,690	491,320	4487,620	-84,360	-1,645

Note: α=5%

Table 8: Analysis Results using Page Test Method

Study Area	Hypotheses	z	H_0 Rejected
Braga	H_0: $\mu_3 = \mu_1 = \mu_2 = \mu_4$ H_1: $\mu_3 \leq \mu_1 \leq \mu_2 \leq \mu_4$	-84.762	Yes
Cihampelas	H_0: $\mu_1 = \mu_2 = \mu_3 = \mu_4$ H_1: $\mu_1 \leq \mu_2 \leq \mu_3 \leq \mu_4$	-84.201	Yes
Dalem Kaum	H_0: $\mu_2 = \mu_1 = \mu_3 = \mu_4$ H_1: $\mu_2 \leq \mu_1 \leq \mu_3 \leq \mu_4$	-84.245	Yes
Merdeka	H_0: $\mu_1 = \mu_2 = \mu_3 = \mu_4$ H_1: $\mu_1 \leq \mu_2 \leq \mu_3 \leq \mu_4$	-84.360	Yes

Note: α =5%

μ_1 = Mean value of scenario of pedestrian lane with one-car-lane
μ_2 = Mean value of scenario of pedestrian lane with two-car-lane
μ_3 = Mean value of scenario of pedestrian with no-car-lane
μ_4 = Mean value of scenario of mall concept

5. CONCLUSIONS

This article reports a study regarding the pedestrian strategy using a response from the visitor of shopping centers in the city of Bandung. As a city with a vision to be the most famous city in entertaining and service in Indonesia, it is important for the government to provide a supportive infrastructure. One important scenario is a pedestrian facility. It is not only important to support economic activity in this city, by providing good facilities, but it is also useful for the people who

reside in this city. A good pedestrian facility provides a good path for people to walk and make an activity with minimal car usage.

In order to achieve the objective, it is imperative to firstly know the preference of the user of sidewalks regarding the most preferred strategy. A good connection between the government's idea with the community's idea will be beneficial for the success of the strategy. Thus, this study tries to elaborate the preference of the community regarding the pedestrian strategy. It is useful before a strategy implemented in real.

In this study, four stated-scenarios are provided to the respondent, i.e. pedestrian scenario with one-car-lane, scenario with two-car-lanes, scenario with no-car-lane, and mall concept. Each respondent is compared with the existing condition. By elaborating this comparison, it can be inferred which scenario is preferred the most.

Results of analysis show that the scenario of pedestrian lane with one-car-lane has relationship with age in the area of Merdeka. Pedestrian lane with two-car-lanes has a relationship with age in Cihampelas and Merdeka. Scenario of pedestrian with no-car-lane is influenced by age in Cihampelas only.

It can also be found that all scenarios are independent with gender and monthly income. It can be summarized that user preferences regarding scenario of pedestrian strategy can be generalized among gender and monthly income.

Further analysis shows that in Dalem Kaum and Merdeka, the scenarios are rated as different. It means visitors in those both areas have different preference with the scenario. On the contrary, visitors in Braga and Cihampelas do not care so much with a specific scenario.

Moreover, an analysis to investigate whether there are different preferences among study location is also conducted. Results show that visitors in each location have different preference regarding a specific scenario. In other words, people in one place show different perception with people in other places about the scenario.

An analysis is also performed to show which scenario is preferred the most. The results of analysis using Braga's dataset shows that respondents give more attention to mall concept's scenario, then followed with a two-car-lane, one-car-lane, and no-car-lane. The result of analysis using dataset from Cihampelas shows scenario of mall concept has the highest priority. The visitors at Dalem Kaum street are also prefer the mall concept, followed by no-car-lane, one-car-lane, and two-car-lane scenario. Analysis for Merdeka's dataset shows a similar result with Cihampelas. Visitors in both location prefers mall concept in the first degree, while it is followed by no-car-lane, two-car-lane, and o one-car-lane.

It can be summarized that each shopping center area has uniqueness. It implies a unique approach of pedestrian strategy. Each location needs special attention before a pedestrian strategy implemented. In general, mall concept receives the highest preference. It means, people in this city have a vision for better transportation system. It can be concluded that further analysis regarding transport demand management, especially dealing with neighborhood transportation in city center becomes more important.

6. ACKNOWLEDGMENT

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