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Bandung City Center Compactness Evaluation

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Abstract

Compact city as a model of urban sustainable development leads urban intensification, encourages mixed-use, and push people to walk or use public transportation. Urban design has significant role to create sustainable development through applying compact city arrangement in the inner city. Bandung City Center that should be accessible through walking among some functions; due uncomfortable pedestrian ways condition has result serious traffic jam and crowded situation. In the end, many visitors and residents prefer to use public transport rather than walking although they are in the walking distance.

This oldest CBD is evaluated based on urban design compactness criteria which are 1) mixed-land use orientation, 2) walking area condition within activity centers, 3) accessibility on using public transportation, and 4) accessibility on using private vehicle. Furthermore, the method to evaluate is comparative technique. In addition, this research conducts survey to 30 visitors and 82 resident about their motives and behaviour in Bandung's down town activities that analyze with descriptive method. The result shows that 1) vertical mix land use is not a domination; 2) lack of transition public area which connect several walkable areas by pedestrian ways; 3) there are mass rapid transport modes that link the hub to the activity centers by walking; and, too many feeder public transportation modes which not serve efficiently, and 4) private vehicles could park in limited shared parking area, however people tend to use feeder public modes instead of to walk afterwards.

Keywords: compact city, urban design, city center

INTRODUCTION

City designing as a part of city planning to materialize a high qualified ciity spatial process is shown in a form of spatial which enables to form a healthy life of society. As a formation of compact city, the city designing is often made to evaluate to see the condition of planning of a certain city in forming spatial which is in line with the scenario of compact city development. Furthermore, European Comission, as Bradecki (2009) recommend that a strategy of compact city development is a basic model to sustainable city design. In addition, there are many researches about compact city that can be the refference for various cities around the globe to adapt in order to create a better city environment.

Dantzig and Saaty (1973) mention that compact city has some levels in its planning, one of them is downtown as a center of a town which is the smallest level of a compact city

model planning where downtown will be the first evaluation or reflection of a city design condition as a whole. The city of Bandung has two central business districts or also called as city service center based on city by law number 18 in the year of 2011 which stated that Alun-alun and Gedebage as city service center. The Alun-alun city service center is the first city center business as the starting of development in the city of Bandung. Along the time this area has changed but it remains to be seen if the condition of city designing in this city service center has met the requirement of compact city that can support the sustainability of city as an important factor to be evaluated further. So, this research is aimed to evaluate the fulfillment characteristic compact city in the center of Bandung city based on variables that will be used in this research.

THE CENTER OF BANDUNG CITY

Bandung, as the capital city of West Java Province, has been built at 1810 by Dutch Colonial Government; and, designed with garden city concept, Bandung was proposed as supporting city for tea plantation surrounding the city. The city center itself, as one of the CBDs in this city, is inhibit by 57.550 populations that live in over 73.5% built-up area with has function as business, leisure, cultural center, and residential.

CBD Alun-alun that later on called as the center of Bandung City is the study area of this research. Whereas the limit of the city downtown is stipulated by allienating the areas that refer to a typical plan for one level of a compact city as Dantiz and Saaty (1973) pointed out, in which the center of city is determined as the core stipulated from the radius 3,060 feet or 932,688 m. The radius core is stated at the zero point that is located on Asia Africa Street with the border north is Merdeka Street, the southern part is on Pungkur Street, the eastern part is Ahmad Yani Street and the western part is Sudirman Street. The size of those areas covered is 1.021.172 ha. These CBD areas are divided into the folllowing detailed division.

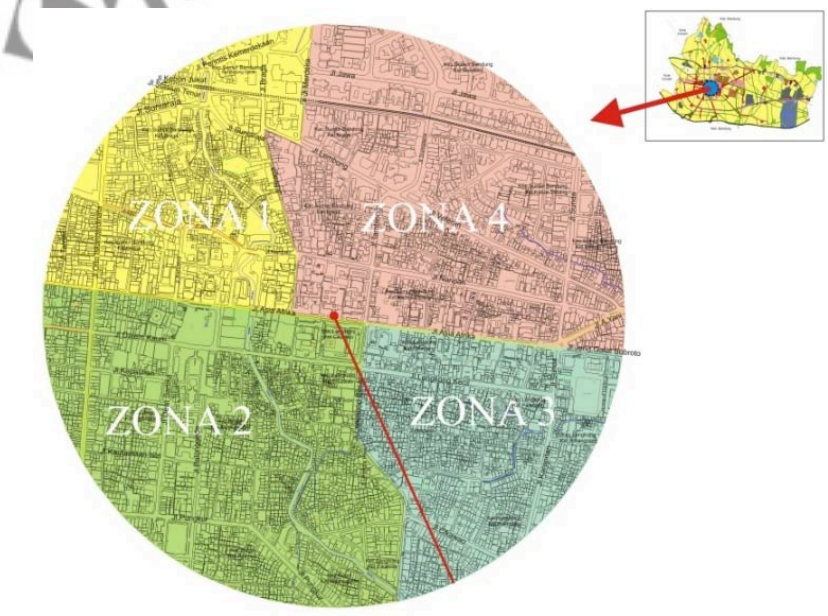


Figure 1. Division in Bandung City Center

RESEARCH METHODOLOGI

Sampling Method

This research is employed primary and secondary survey. Primary survey is carried out through distribution of questionaire to 82 persons of local resident and 30 visitors of center of town. The questionaire is related to the movement in the center of the city. Aside from that, another primary survey technique used is observation on the land use condition, transportation and the activities center. Using formula in AROPI (2009), the counting of local people respondent and visitors number of sample is based on the following formula.

$$number\ of\ sample = \frac{Z^2\ .p\ (1-p)}{E^2}$$

where:
Z : the score of z indicates the confidencescale of 90%, z values = 1,65
P(1-p) : population variety that is indicated in the form of proportion
E : expected sampling error from the z value of 90%, E scores 10%

Based on the formula above and the number of the local people; so, the sample of the local people taken is 82 persons. While the number of visitors respondents is stipulated based on accidental sampling technique since there is no official registration indicating the number of peeople visiting the downtown daily, monthly, or yearly; so, the amount of sample produced is 30 personss (based on minimal sampling standard of accidental sampling as Lin mentioned (1976).

Analysis Method

This research employs comparative evaluation techniques by comparing criteria of the stipulated variables with the condition of observation result toward the following evaluation (1) the fullfilment of mixed use land evaluation, (2) walkable area evaluation, (3) the evaluation of the accessibility to the center of town by public transportation, (4) the evaluation of the accessibility to the center of town by private vehicles. Another technique used is descriptive qualitative by exposing condition and the respond answer result as the strengthening for the conducted evaluation.

Variabel Used

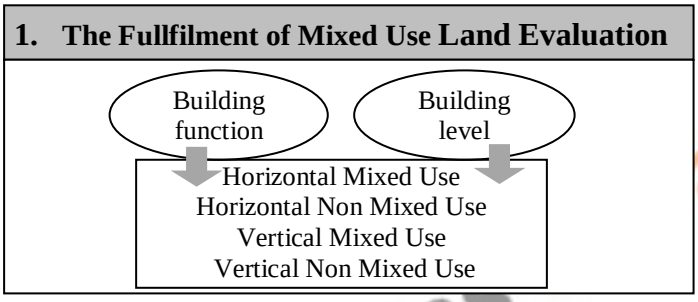
There are 3 main variables used in this research in which those variables will be part of 4 evaluation steps of the fulfilllment of compact city in the downtown of the Bandung City. Those 3 variables can be seen in Tabel 1, while Figure 2 shows its relation in the evaluation steps.

Tabel 1. Compact City Evaluation Variable, Indicator, and Parameter For Bandung City Center

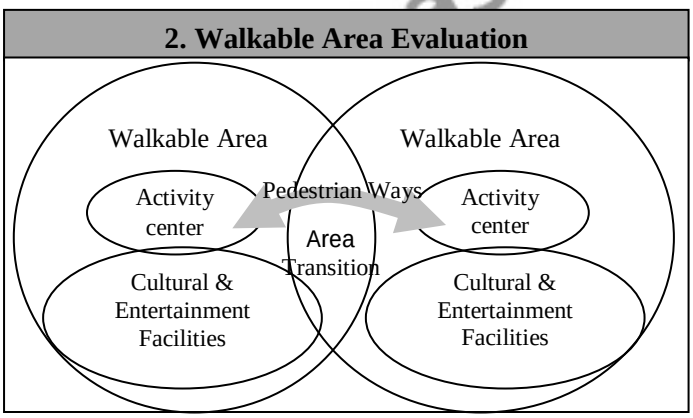
Variables and Indicator	Parameter
Mixed Land Use Indicator: The following are the order of the degree of mixed land use : • Horizontal Mixed-Use • Vertical Mixed Use • Mixed Use Walkable Area	**Horizontal Mixed Use:** There are three functions or more in this area **Vertical Mixed Use :** 2 minimum functions of vertical mixed use **Mixed Use Walkable Area:** Mixed use walkable area (combination between vertical and horizontal mixed use) and walking distance which is no more than 10 minutes
Transportasi Indicator: Accsessbilities and mobilities	• **Pedestrian (sidewalks):** ➢ The minimum width of sidewalks is 1,5 m, high-rise density 3 m, retail 3,77 4,6 m ➢ Length of journey o House – office : 15 minutes o House – school : 10 minutes o House – shops :10 minutes ➢ The distance for pedestrian o Tropical countries (indonesia) + 400 m ➢ Transit facilitiess (for examples benches and kiosk)
	• **Public Transport:** ➢ The use of mass pransportation that is accessible ➢ The avilability of mass transportation passing the center of the city ➢ Travel Cost (affordability) ➢ Comfort and safety of transportation users ➢ Length of journey
	• **Circullation and Parking:** ➢ **Public transportation circulation** o The mapping of public transportation passing the center of the city which are accessible o The circullation of the public transportation passing the center of the cit should create smoothness, safety and comfort ➢ **Private vehicles circullation:** o Having access to all of city center activities o Limited in number but with good accses ➢ **The pedestrian and cyclist circullation:** o The flow of the pedestrian (including for the handicapped person and the elderly) and cyclist designing system is specially designed for the designed area
	• **Parking system:** ➢ On-Street & Off-Street Parking ➢ Should cover the walkable area and the city center
	• **Cycling:**

Variables and Indicator	Parameter
	➢ The width of cycling track is 1-2 meters ➢ The availability of parking area for the cyclist ➢ The availabiliy of bicycle rental
3. *Activity Center* Indicator: • The existence of center for activities as the cultural and entertainment activities	Cultural and entertainment facilities that consist of art performance center, studio and gallery, museum, outdoor entertainment (festivall)
• The availability of supporting facilities like green and non green area	*Public Space: Parks, Plaza* as the transitional area facilities

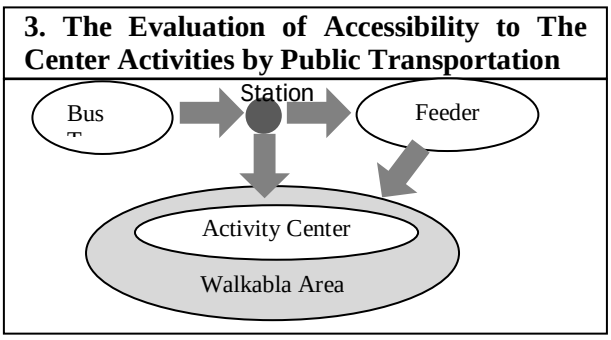
Source: Schwanke & Flynn (1987), American Planning Association (2006), Foord (2010), GGC (2009), Miller & Miller (2003), Nurani (2008), Shirvani (1985), Indrosaptono (2003), Dantzig & Saaty (1973), Nijkamp & Rienstra (1996), Ministry of Public Works Regulation no. 6 year of 2007 about General Guideline of Building and Neighborhood Area (2007).



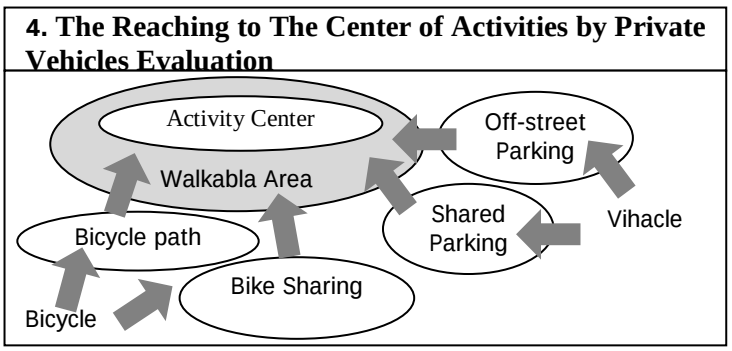
Objective
Identify mix use condition



Objectives
- Identify pedestrian accessibility between activity centers
- Identify transitional and pedestrian ways facilities between *walkable area*



Objective
To identify public transport accesibility in the *walkable area*



Objectives
- To identify private vehicle accesibility to *walkable area* supported by parking faciity
- To identify bicycle accesibility

Figure 2. Compactness Evaluation Stages

THE FULFILLMENT CHARACTERISTIC OF THE CENTER CITY OF BANDUNG TOWARDS COMPACT CITY VARIABLE

The Fullfilment of Mixed Use Land Evaluation

According to American Planning Association (2006), the usage types of mixed land is divided into two which are vertical mixed use and horizontal mixed use. The mixed land use is seen based on the function and the height of the building (the number of the floors) to picturize the center of Bandung City based on the vertical mixed use process, vertical non mixed use, horizontal mixed use, and horizontal non mixed land use.

Based on those previous categories, the city of Bandung has a very big proportion which is around 71 % towards horizontal mixed use and the rest are 21 % for the horizontal non mixed use, 5% for vertical mixed use and 3% for the vertical non mixed use of the land size (Table 2 and Figure 2). Based on the teory of building height that Bergel (1955) stated, the CBD requires the building in vertical position with the reason its high price and accessibility which makes the use of mixed land vertically is very important in a city. In this case, the center of the city of Banding has not reached to the high rise building that combined the mixed land use vertically. It can be seen from the horixontal mixed use proportion that is higher than the vertical mixed use. The number of vertical building in the city of bandung is quite lot but it still has not indicated the vertical mixed use area in one whole block, it only has 20 buildings or so.

Table 2. The Mixed Land Use Category Percentage in The Center City of Bandung

Kategori Mixed Use	Zona 1	Zona 2	Zona 3	Zona 4	TOTAL
Horizontal Mixed Use	12%	18%	15%	26%	71%
Horizontal Non Mixed Use	1%	12%	2%	5%	21%
Vertical Mixed Use	1%	4%	0%	0%	5%
Vertical Non Mixed Use	2%	1%	0%	1%	3%
Total *Mixed Use* (*Horizontal + Vertical*)	**13%**	**22%**	**16%**	**26%**	**100%**

Source: Calculation from the map based on the survey, 2012

Walkable Area Evaluation

According to American Planning Association (2006), the land use of mixed land use can encourage people to be walk with the distance of 400 m that can be reached in 10 minutes; additionally, Dantzig and Saaty (1973) stated it should less than 30 minutes. The survey clearly shows that 57% from 82 local people respondents walk in the center of the city. The walking activities is dominated by the journey of their shopping activities which takes around 10 to 15 minutes from their houses. The time spent is in accordance with the walking time spent in the compact city which takes less than 30 minutes. The walking activities in the center of the city business district is not without purpose. CBD as the center of a city has center activities that attract people to walk fro 400 m (walkable area). The center of Bandung city has 16 activities centers that draw people to walk to reach those area.

Figure 2. Mixed Land Use Evaluation in The Center of Bandung City

CBD has some functions, some of them as mention by Gallion and Eisner (1996) are trade function in city city scale (big and retailers stores) and offices. Additional functions, remark by Paumier (2004), are cultural and entertainment facilities, and education as the basic needs for people living in the city. Those 16 center activities have 16 walkable areas that is interconnected one into another. It means that the walking distance of 400 m can be continued into another 400 m which neds an area of transition.

The area of transition can be in the forms of kiosk/cafetaria, benches along pedestian ways and active park. Kiosk and caetaria dominate the transition place in the city of Bandung while legal and illegal street vendor also share the place. There is just one active park in this area which is located in Alun-alun (the main plaza) and the benches along pedestrian ways are rare to see and even it only exist in 2 places namely Braga street and Merdeka street. Unfortunately, there are four out of 13 transititon areas without any facilities support.

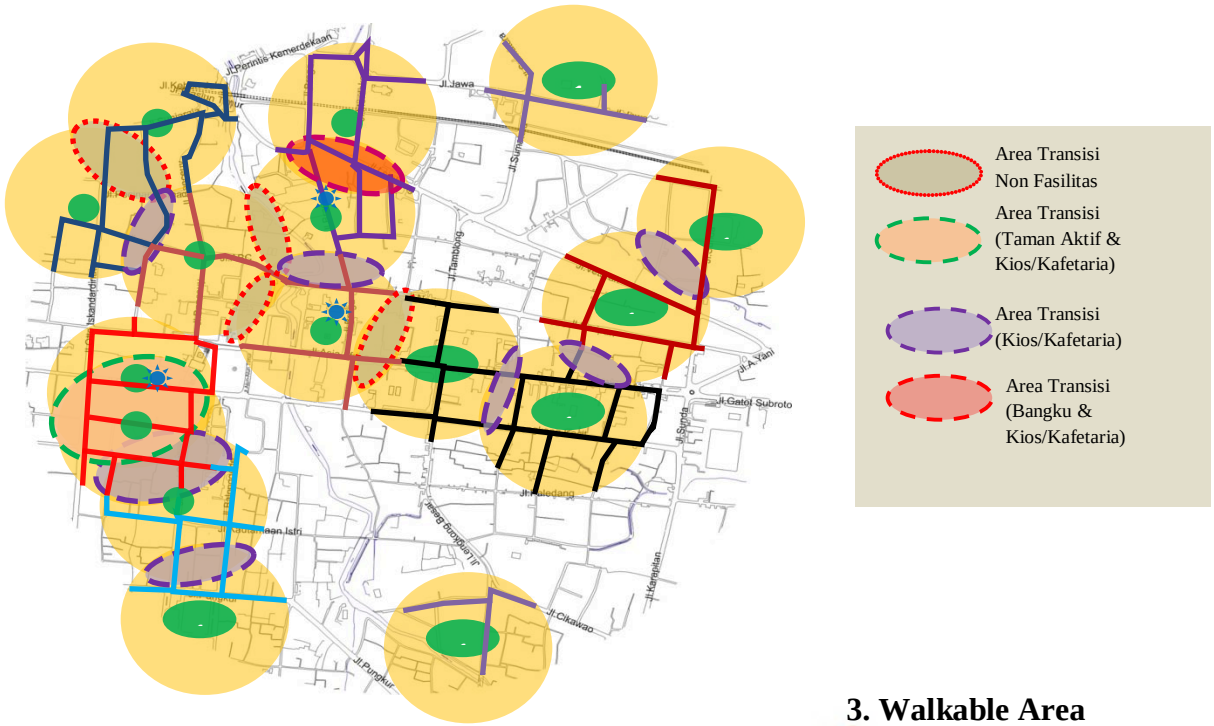


Figure 3. Walkable Area Evaluation in The City Center of Bandung

The pedestrian reaching to the walkable area is not only supported by transition area but also by the pedestrian ways which include streets. Some of those streets have trotoar facilities but some do not have such luxury. Unfortunately, some of the trotoars have changed the function which originally is used to give comfort for the pedestrian; but, later on used by street vendors or even it is used for parking lot. Some others are not in good condition and blocked by trees that make those pavements are not effective to use for the pedestrians. They feel uncomfortable and not safe. Based on the conducted survey to 53 % of local people and 87 % visitors, it comes up with the conclusion that those unfortunate circumstances stated before, contributed to the uncomfort situations for the pedestrians.

The Evaluation of Accessibility to The Center Activities by Public Transportation

There are two kinds of public transportation available in this city center. They are mass transportation like bus (DAMRI bus) and public car named 'angkot'. Those two public transportation inter connect people to the center of activities area or walkable area. The patterns are public transportation – public transportation shelter/stop – walking – the center of activities or public transportation /bus – shelter – public car/angkot as feeder walking – the center of activities.

There are 5 plying routes of public mass transportation in the city of bandung which are 1) Cicaheum – Cibeureum route, 2) Leuwipanjang – Dipatiukur, 3) Leuwipanjang – Ledeng, 4) Leuwipanjang – Cibiru, 5) Cicaheum - Leuwipanjang. Five mass transportation shelters are provided to take the users of this kind of transportation to walk to the center of activities which are within walking distance from the shelters. Those five shelters are located in Asia Africa, Banceuy, Otista, Lembong and Alun Alun. Aside from using the mass transportation, people also use public car /angkot to reach the center of activities.

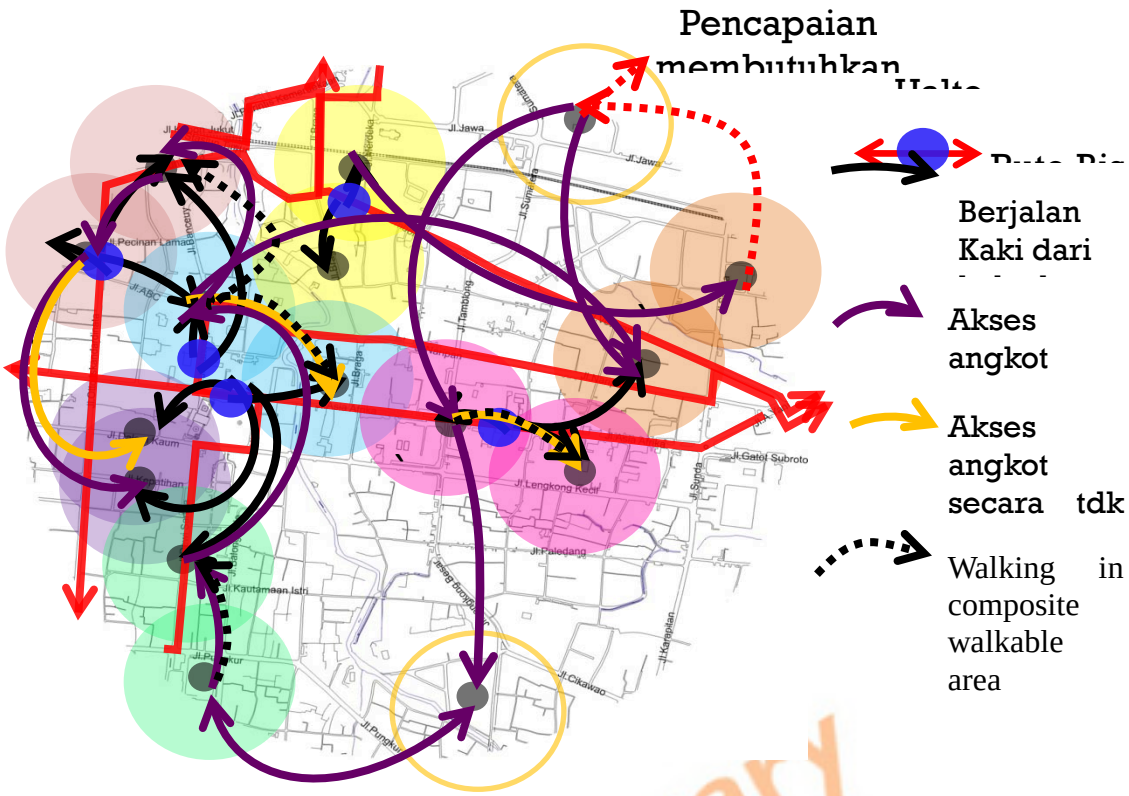


Figure 4. The Evaluation of Reaching to The Center of Acvities /Walkable Area

The principle of compact city is to highliight the usage of public transportation, Dantzi and Saaty (1973); however, based on the survey tested showed that 35 % of the local people and 73% of the visitors prefer to use public car/angkot to mass transportation like city bus.

The Reaching to The Center of Activities by Private Vehicles Evaluation

In this part, we are going to evaluate the reaching to the center of activities by vehicles first. The questionaire shows that there are 70% of the visitors and 30% of the local people use private vehicles to reach the center of activities while cyclist is only one respondent.

Although compact city highlights to the usage of bicycle, as Mori (2011) mentioned and also Dantzig and Saaty (1973) emphasizing walking and mass transportation using, it doesnt rule out that private vehicles can not accses to the center of activities, the compact city. Private vehicles can accses and reach all center of activities but those private vehicles must be supported by the existence of off-street parking and share parking in which mixed land use encourage the needs of share parking (GGC,2009) (miller & miller, 2003)

There are 4 off-street parking which are located in alun-alun, naripan st, balonggede st and asia afrika st. Those off-stree parking encourage the private vehicles users to walk to the center of activities/walkable area alongside with the existence of shared parking in 13 buildings that are located in the center of this area.

Unfortunatelly based on observation we can still find the existence of on street parking which narrow down the street that disturb the traffic in the center of Bandung. Actually off-street parking and shared parking can cater the private vehicle users who want to go to those 16 center of activities in downtown. Those private vehicle users can park in designated parking places and walk. However, this research does not count about the capacity between supply and demand of parking needs. Additionally, from the questionaire, due to no bicycle path in this area, the bicycle owners support for availability of that path and bike sharing facilites.

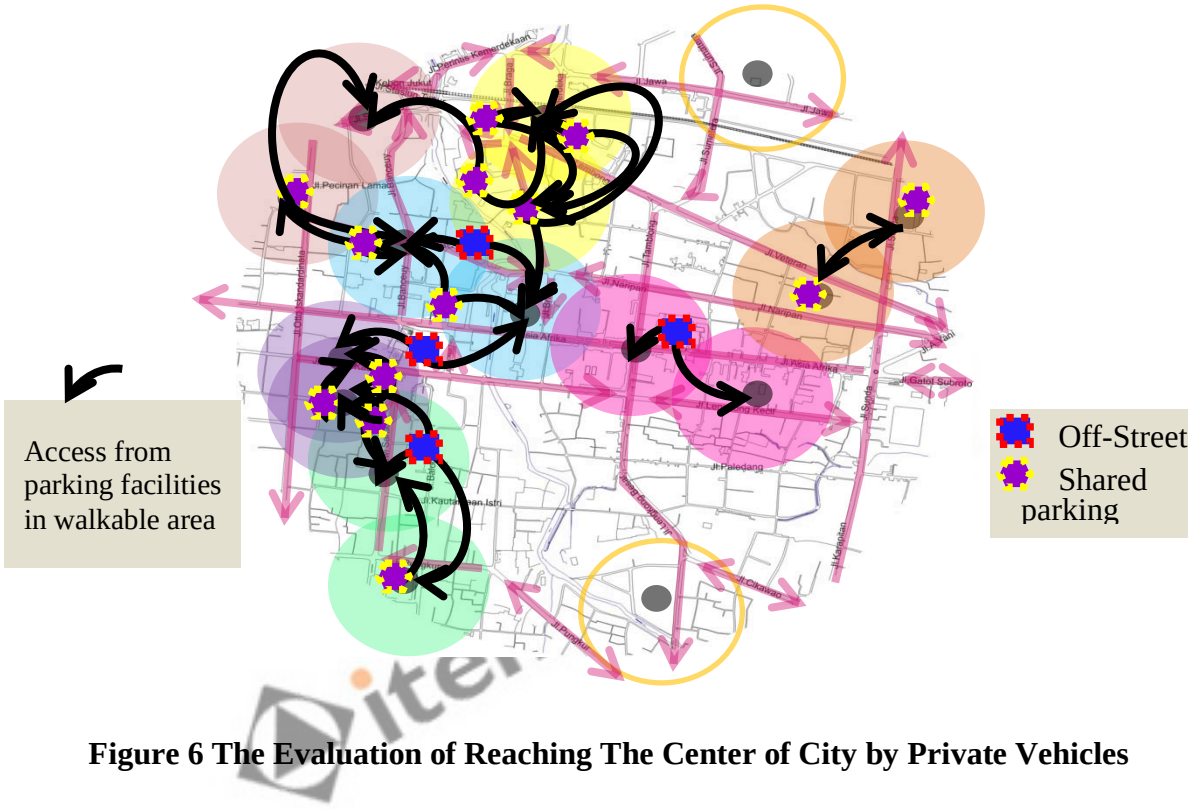


Figure 6 The Evaluation of Reaching The Center of City by Private Vehicles

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CONCLUSION

To sum up, generally Bandung City Center is not compact yet, due to lack of vertical mixed-use building, and limited support for pedestrians such as public transition area which facilitated by benches and active public park. Furthermore, local people and visitor behavior which prefer to use private vehicle rather than public. Although there are 16 walkable areas existed, this city center design has make people not to walk easily which mean there are long road to make

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