

## **Traffic Management during *Ngaben* Funeral Ceremony at Hasanuddin and Thamrin Streets, Denpasar City-Bali**

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### **ABSTRACT**

*Ngaben* is a traditional funeral held by the population of Balinese Hindu. The ritual of *Ngaben* mostly uses Hasanuddin Street and Thamrin Street as an access to reach *Badung* cemetery. The purpose of this research is to manage the traffic for minimizing traffic congestion for some streets in the heart of Denpasar city, so that the two important activities: the ritual of *Ngaben* and urban traffic would harmoniously been done. The Indonesian Highway Capacity Manual (IHCM, 1997) has been used for level of service analysis, with traffic volume be assigned based on OD movement obtained from licensed-plate matching survey. The method of all or nothing has been applied. The result shows that some street have opportunity to be an alternative routes. This research is the first attempt to analyze such *Ngaben* Funeral ceremony impact on traffic congestion, and the result is helping Denpasar City Government to reduce traffic jam.

**Keywords:** *Traffic Management, Traffic Congestion, Traffic Assignment, Ngaben, Denpasar, Indonesia*

### **1. INTRODUCTION**

*Tri Hita Karana* is one of the most important Balinese traditional philosophy. The word *Tri Hita Karana* is etymologically formed from the word *tri* means three, *hita* meaning happiness, dan *karana* meaning cause or causing (Bali Provincial Government, 2010). These words can be defined as three harmonious relationship causing happiness. The three relationships involve harmonious relationship between human and God, among humans, dan between human and environment. The three harmonies relationships are believed as bringing happiness in human life. From such a belief, it is very important for all of the Balinese to still abide their traditional rule and culture that are still to be honored and believed. One of the Balinese traditional rules and cultures that are still occurred today is a funeral ceremony called *Ngaben*. In

reality, the traditional ritual process of Ngaben simultaneously uses road infrastructure with other road users.

A vast literature is available on traffic management during traditional or big events. Some topics discussed in the literature are Spectator Arrival and Departure Traffic Mode and Influence Factors in Beijing Olympic Games Opening and Closing Ceremony by Xinhua et al (2011), and Analysis on Beijing Subway Flows during the 29<sup>th</sup> Olympics by Yukun (2008). The special events which are activities planned in advance and significantly increases travel demand has been investigated by Shahin et al (2014) in a research of Evaluating Transportation Preferences for Special Events: A Case Study for a Megacity, Istanbul. The traffic management studies for Athens Olympic Games also provide valuable results for handling large-scale events that has been done by Frantzeskakis and Frantzeskakis (2006).

Based on Land Use Structural Plan of Bali Province in 2010-2030, Denpasar City is the center of national activities, the capital city of Bali province and the southern center of Bali urban system that serve the functions as central government city, center of goods and services activity, center of transportation activity, tourism, and settlement development that having a strong direct effect on the surrounding areas.

With such an establishment, annually, Denpasar City experiences high population growth, and it also has an impact on high growth of private vehicles. A traditional district of Pekraman is part of Denpasar city which is administratively the biggest traditional village with 13 villages including 104 streets having the potential causes of congestion-related delays arising from the Ngaben funeral ceremony procession. This happens because the funeral ceremony and motor vehicle users use the same road infrastructure simultaneously.

Badung cemetery, which is the main destiny of the Ngaben funeral procession of 13 villages, is located in the center of Denpasar. This will certainly have an impact on high traffic congestion if there is no solution to these problems, since most of the street in this area is quite dense with high mobility movement. Therefore, this research is urgent to do, since transportation planning and traffic management that related and synergies with the local customs and culture is needed to be able to overcome the problems occurred.

## **2. RESEARCH METHODS**

### **2.1. Study Area**

The study area of this research (Figure 1) is Hasanuddin and Thamrin Street which are the primary roads in traditional district of Pekraman, Denpasar. The selection of this study area is based on the location of this village which has great potential cause of traffic congestion problems related to the implementation of Ngaben funeral ceremonies. The area of the custom district of Pekraman in Denpasar is 1882 ha, with

an area of fairly large village and it lies in the middle of Denpasar. It is feared that in the near future, there is a getting worst traffic congestion occurs at Hasanuddin and Thamrin Street when the funeral ceremony is in progress.

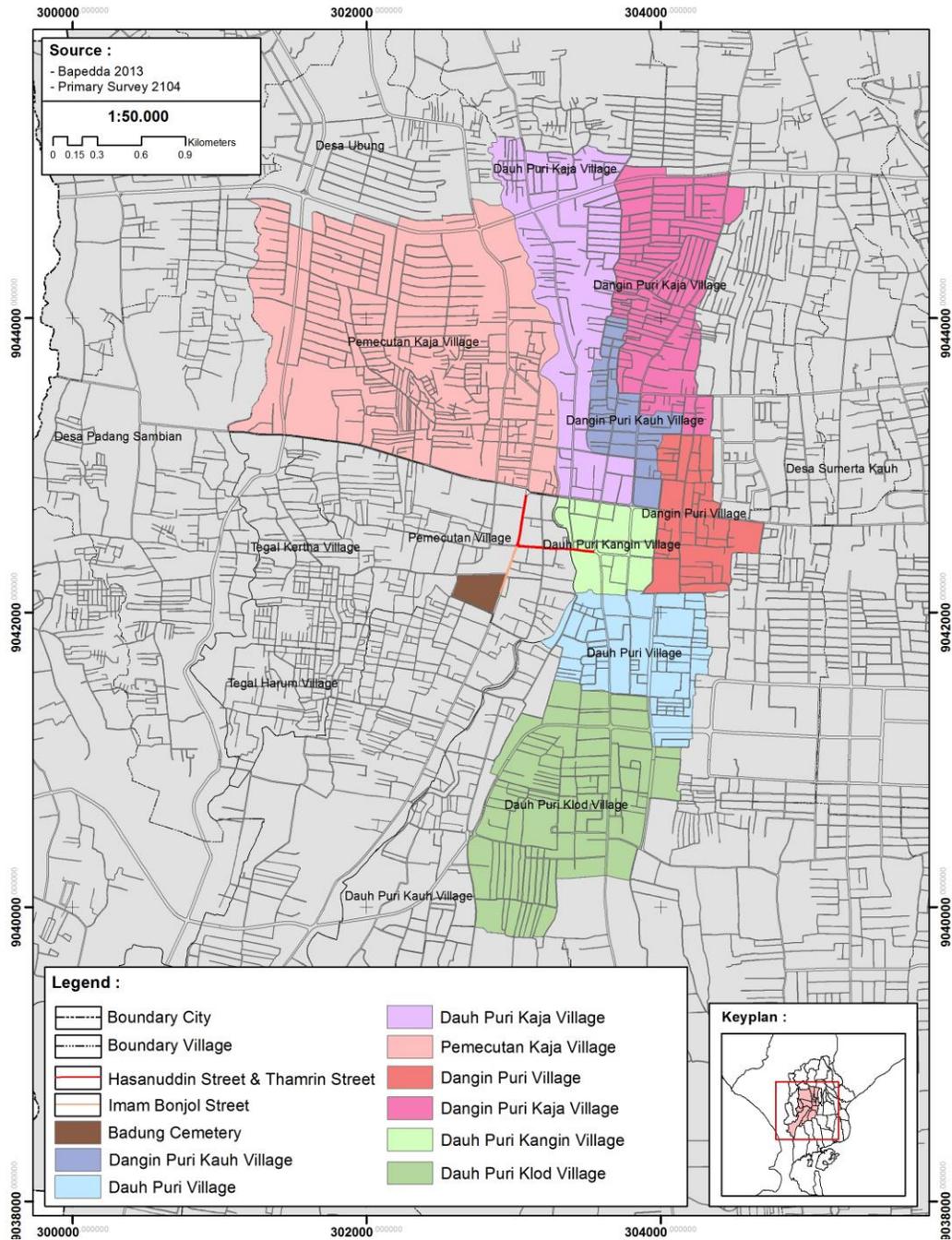


Figure 1. Study Area at Denpasar City, Bali

## 2.2. Type of Research

The type of research used in this study is a descriptive evaluative study using a conventional method of all or nothing methods for traffic assignment. The simple all or nothing methods has been applied instead of the traffic simulation, due to limited information on when Ngaben will be held, while sometime the driver is a tourist with no information on street network, therefore the impact is worsened and also because of limited number of alternative route for alleviating traffic congestion.

### 2.3. Variable of the Study

This study was conducted to determine the traffic management of Denpasar city streets based on the traffic flow movement destination when the Ngaben funeral ceremony took place in the district of Pekraman Denpasar. Table 1 shows the variable of this study.

**Table 1. Variables of the Study**

Variable	Sub Variable
Traffic Pattern	<ul style="list-style-type: none"> <li>• Origin-Destination of existing traffic pattern</li> <li>• Ngaben Funeral Ceremony traffic pattern</li> </ul>
Road Performance	<ul style="list-style-type: none"> <li>• Road capacity</li> <li>• Traffic volume</li> <li>• Degree of Saturation</li> </ul>
Traffic Flow Distribution	<ul style="list-style-type: none"> <li>• Continuous traffic</li> <li>• Local traffic</li> </ul>
Traffic Management	<ul style="list-style-type: none"> <li>• Detouring traffic assignment</li> </ul>

The traffic pattern identification includes route, origin and destination of existing traffic pattern and Ngaben funeral ceremony traffic pattern in study area. Traffic pattern variable will be used to identify the road infrastructure that simultaneously used by road users and the participant of funeral ceremony. Road performance will be measured using degree of saturation measurement by identifying the road capacity and traffic volume on the affected road: Hasanuddin and Thamrin Street. Traffic flow distribution consist of continuous and local traffic. The continuous traffic will be diverged to alternative streets, whereas local traffic will be assigned to pass the Hasanuddin and Thamrin street, by following behind the Ngaben funeral ceremony entourage. In order to deal with traffic management during *Ngaben* funeral ceremony, the researcher will apply the all or nothing method to detour the traffic as has been explained before.

## 2.4. Technical Analysis

The technical analysis used in this research is the analysis of the road capacity, traffic distribution and traffic assignment.

### 2.4.1. Analysis of Road Capacity

Following the Indonesian Highway Capacity Manual (IHCM), the road capacity is the maximum number of vehicles that can pass a given point during a specified period under prevailing roadway, traffic, and control condition. The main factor affecting road capacity is roadway condition such as number of lanes, the type of road facility and its surrounding development or environment, lane widths, shoulder widths and lateral clearances, and also the city-sizes. Thus, the road capacity formula that used in this research is as follow:

$$C = C_o \times FC_W \times FC_{SP} \times FC_{SF} \times FC_{CS} \dots\dots\dots (1)$$

Whereas:

- C = Capacity (pcu/hour)
- C<sub>o</sub> = Basic capacity (pcu/hour)
- FC<sub>W</sub> = Lane widths adjustment factor
- FC<sub>SP</sub> = Distributional proportion of traffic volume adjustment factor
- FC<sub>SF</sub> = Shoulder widths and lateral clearances adjustment factor
- FC<sub>CS</sub> = City size adjustment factor

The aim of this analysis is to determine the road service level of Hasanuddin Street and Thamrin Street. Therefore, in this study, the road service level is using the Degree of Saturation (DS) as the indicator, the formula of Degree of Saturation (DS) of the road is (Tamin, 2000):

$$DS = V/C \dots\dots\dots (2)$$

Notes:

- DS = Degree of Saturation
- V = Traffic Volume
- C = Road Capacity

### 2.4.2. Analysis of Traffic Distribution

Analysis of traffic distribution is carried out to determine the continuous (inter-city) and local traffic in this study area by utilizing Licensed-plate matching survey. The traffic distribution analysis is done by calculate and obtain the volume of traffic (pcu/h) both from continuous traffic and local traffic. From the results of this analysis, it was obtained priority traffic which form the basis of evaluation for traffic management that would be applied during the Ngaben funeral ceremony.

### **2.4.3. Analysis of Traffic Assignment**

The main objective of this research is to create a traffic management based on local wisdom and needs. The purpose is to make a simultaneous and beneficial movement of both urban traffic and Ngaben funeral ceremony process. For traffic assignment analysis, the analysis is done by assigning the traffic volume that will be diverted following the destination of movement on alternative streets. The continuous traffic will be diverted to alternative streets, whereas local traffic will be diverted to pass the Hasanuddin and Thamrin street, by following behind the cremation ceremony entourage. In this analysis, the researchers assumed that the driver of continuous traffic prefer to change the route regardless of distance and time, rather than to be stopped because of the funeral ceremony procession. Therefore the researcher did not investigate the improvement of traffic congestion on existing road that used by funeral ceremony, but assign the traffic volume to other alternative road.

## **3. RESULTS AND DISCUSSIONS**

### **3.1. Characteristics of Ngaben Funeral Ceremony Traffic Patterns Ngaben via Hasanuddin Street and Thamrin Street**

In the process of Ngaben funeral ceremony, the parade uses road as a path to Setra (grave) as a crematorium place. In its development, the process of funeral ceremony directly strike other road users. It certainly would cause traffic congestion problems. The Ngaben funeral ceremony traffic pattern is the movement from the origin to destination of the funeral ceremony procession, where the purpose of the Ngaben movement in this study is *setra Badung (Badung grave cemetery)*. For the Ngaben funeral ceremony traffic patterns through Hasanuddin Street and Thamrin Street was divided into 8 villages of origin. There is a Ngaben through Hasanuddin street for those coming from 6 villages (Kauh Daging Puri, Puri Kangin Dauh, Kelod Dauh Puri, Puri Dauh, Daging Puri Kaja and Sub Daging Puri), while the other through Thamrin street for those coming from 2 other villages (Dauh Puri Kaja and Kaja).

The map in figure 2 presents the condition that there are 8 villages uses the main street, Hasanuddin Street and Thamrin Street for funeral ceremony. In its development, this funeral ceremony strike directly with other traffic movement, the problem is getting worst as the traffic is increased annually. This phenomenon will certainly cause a problem considering the two roads, Hasanuddin and Thamrin Street, which are connecting roads to central activities in Denpasar, having the most crowded traffic with the highest mobility of tourism activity.

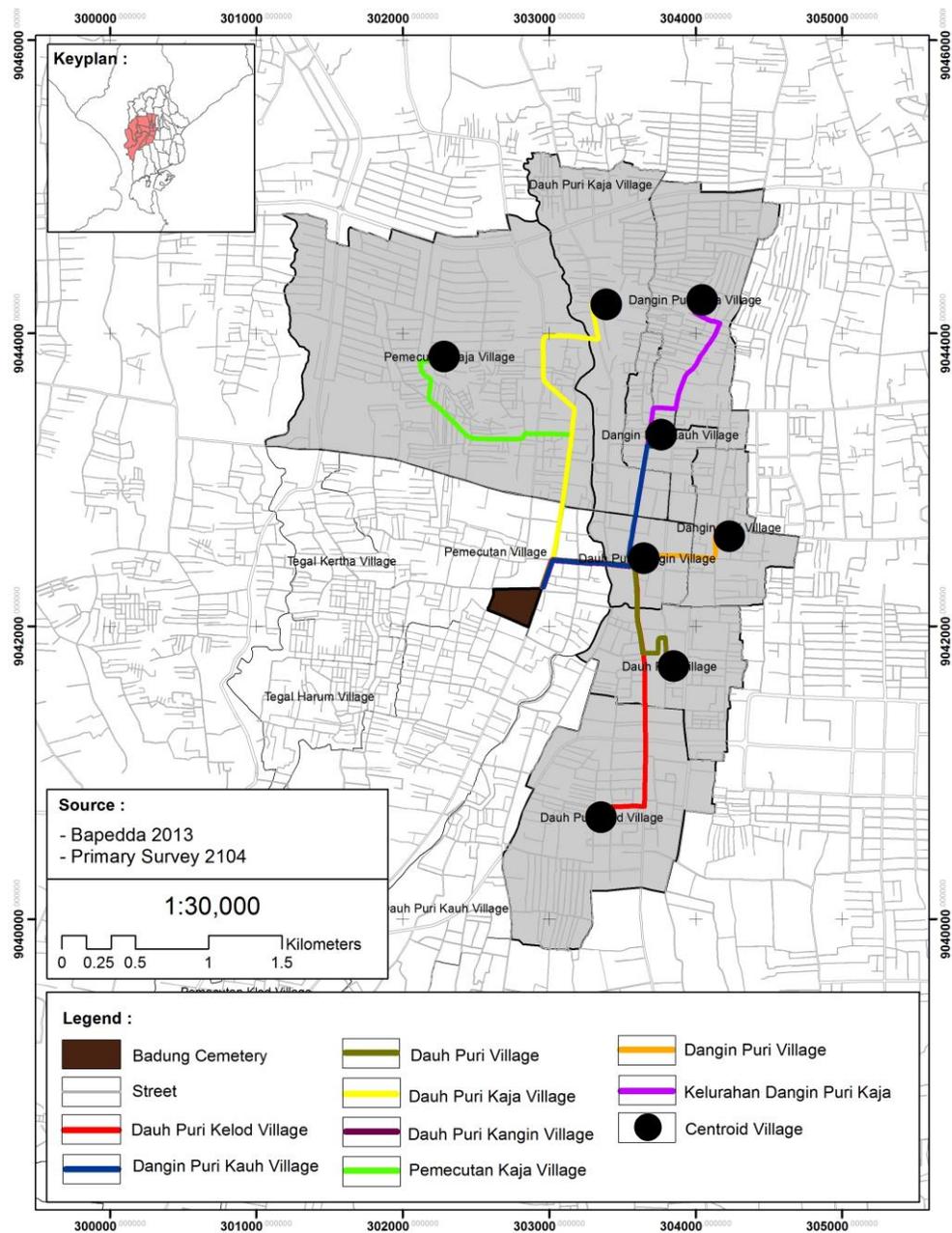


Figure 2. Map of Funeral Ceremony Movement Pattern through Hasanuddin and Thamrin Street

### 3.2. The Characteristics of Hasanuddin Street

Hasanuddin Street is a provincial road network that has function as a secondary collector road that connects Dauh Puri Kangin village and Pemecutan village. The function of the street dominating Hasanuddin Street is for trade and services activity.

Based on the hierarchy, Hasanuddin street is already following its function as a secondary collector road network that connect central city area with urban fringe.

### 3.3. The Characteristics of Thamrin Street

Thamrin Street is a national road which has the function of secondary collector roads according to its function as a connector among the centers of activity in Denpasar. The function of land dominating Thamrin Street is trade and services area, and there is also some form of entertainment in the city such as city-scaled theaters. Thamrin Street, as a secondary collector road, is also the passageway of Hasanuddin Street. Thamrin street is already in accordance with its function as a connector among central activities and central part of the city with service centers area. This can be seen from the circular flow of vehicles using this road as a connecting road to get to the center of town activities given that there is Badung market around the region.

In this study, for the purpose of analysis, Table 2 shows that there is 4 (four) segments consist of 3 (three) segments in the Hasanuddin Street and 1 (one) segments on Thamrin Street. The three segments at Hasanuddin streets is defined with the aims to determine the detailed level of service and the characteristics of the Hasanuddin street, since there is a different traffic volume of the three segments, because of some junction add and reduce different number of traffic volume at Jalan Hasanuddin

Table 2. The Physical Characteristics of Hasanuddin Street, Thamrin Street and Imam Bonjol Street

Road Characteristics	Hasanuddin Street			Thamrin Street
	Segment 1	Segment 2	Segment 3	Segment 4
Types of Road	One Way	One Way	One Way	One Way
Length of Road (m)	146	210	178	351
Width of road (m)	7	7	7	7
Shoulder width (m)	2	1	2	2
Median width (m)	NA	NA	NA	NA
Types of surrounding road activities	Commercial Area	Commercial Area	Commercial Area	Commercial Area
Side-Friction Class	Medium	High	Low	High

### 3.4. Road Level of Service

The land use of Hasanuddin and Thamrin Street which is the main street of Denpasar is dominated by the form of trade and services, therefore it has an unstable road level of service at peak afternoon and evening hours. This would be very problematic and having negative impact on the transportation system and traffic flow of Denpasar city,

considering that the Ngaben funeral ceremony is always done during the day-time. The level of services is following the Indonesia regulation (Minister of Transportation, 2006). The following is the existing road degree of saturation (DS) and level of services (LOS) of existing Hasanuddin and Thamrin Street.

Table 3. Hasanuddin and Thamrin Street Existing Level of Service

Segment	Day	Peak	DS	LOS
Segment 1	Work	Morning	0.54	A
		Afternoon	0.81	D
		Evening	0.91	E
	Off	Morning	0.44	A
		Afternoon	0.51	A
		Evening	0.69	B
Segment 2	Work	Morning	0.83	D
		Afternoon	0.89	D
		Evening	0.92	E
	Off	Morning	0.55	A
		Afternoon	0.80	C
		Evening	0.88	D
Segment 3	Work	Morning	0.52	A
		Afternoon	0.66	B
		Evening	0.76	C
	Off	Morning	0.42	A
		Afternoon	0.60	A
		Evening	0.69	B
Segment 4	Work	Morning	0.68	B
		Afternoon	0.80	D
		Evening	0.88	D
	Off	Morning	0.63	B
		Afternoon	0.73	C
		Evening	0.90	E

Table 3 shows the degree of saturation (DS) and Level of Service (LOS) of Hasanuddin Street which is divided into three segments and Thamrin Street with one segment of both on weekdays and week-ends. The worst service levels is occurred during lunch time and afternoon peak hour; therefore it will increasingly become a traffic jam when there is a procession of Ngaben funeral ceremony.

### 3.5. Traffic Distribution Analysis

The analysis of traffic distribution functions is to determine how much the local traffic and continuous traffic flow of vehicles that affect performance of Hasanuddin and Thamrin Street. The data has been obtained from Licensed-plate matching surveys, that is by matching the vehicle license plate on the 7 predetermined points around the study area. Licensed-plate matching method is done by matching the last digit and the last letter on motor vehicles licensed plate. There is two type of flow:

local traffic and continuous traffic. The continuous traffic will be diverged to alternative streets, whereas local traffic will be allowed to pass the Hasanuddin and Thamrin street, by following behind the cremation ceremony entourage. The following is the result of the calculation of local and continuous traffic at Hasanuddin and Thamrin Street. Table 4 shows the number of continuous traffic flow of vehicles on Hasanuddin and Thamrin Street of 2120.95 pcu/hour or 88.66 % of the total traffic volume, while the rest are local traffic flow of 271.3 pcu/hour or 11.34 %.

Table 4. Traffic Distribution at Hasanuddin Street and Thamrin Street

$\Sigma$ Continuous traffic (pcu/hour)	Continuous traffic (%)	$\Sigma$ Local traffic (pcu/hour)	Local traffic (%)
2120.95	88.66%	271.3	11.34%

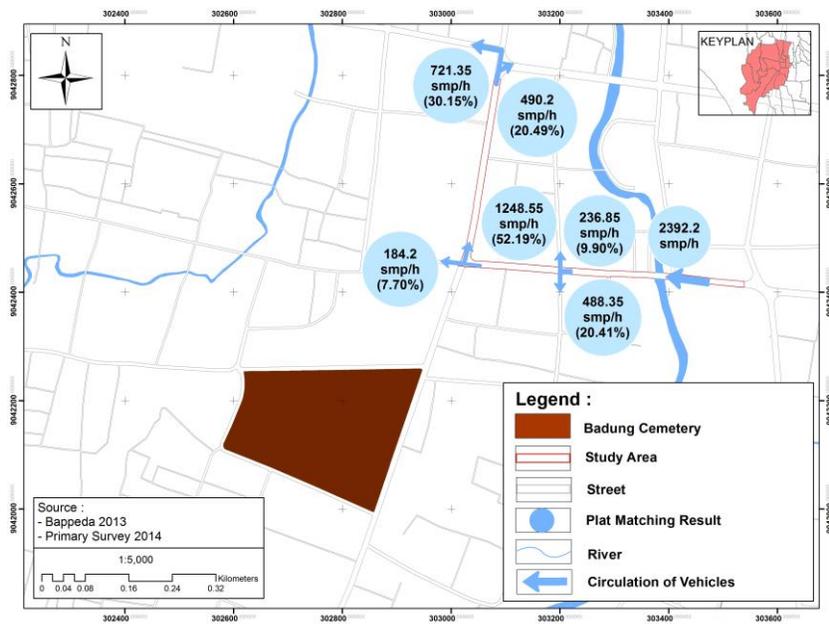


Figure 3. Map of Traffic Distribution at both Hasanuddin and Thamrin Street

From Table 4 and Figure 3, it can be seen that there are three main continuous traffic flows with a total volume of traffic that dominates. The three continuous traffic flows are the flow of vehicles to Imam Bonjol Street with a percentage of 20.5 %, to Wahid in Street with a percentage of 28.11 % and to Gajahmada Street with a percentage of 20.47 %.

Table 5 shows the number of continuous traffic flow on Thamrin Street which is 934.55 pcu/hour or 96 % of the overall traffic volume, which is later divided into two destination, namely Wahidin Street and Gajahmada Street. As for local traffic flow on Thamrin Street coming from Imam Bonjol Street is very small only at 39 pcu/h or 4 % .

Table 5. Traffic distribution on Thamrin Street coming from Imam Bonjol Street

$\Sigma$ Continuous traffic (pcu/hour)	Continues traffic (%)	$\Sigma$ Local traffic (pcu/hour)	Local traffic (%)
934.55	96%	39	4%

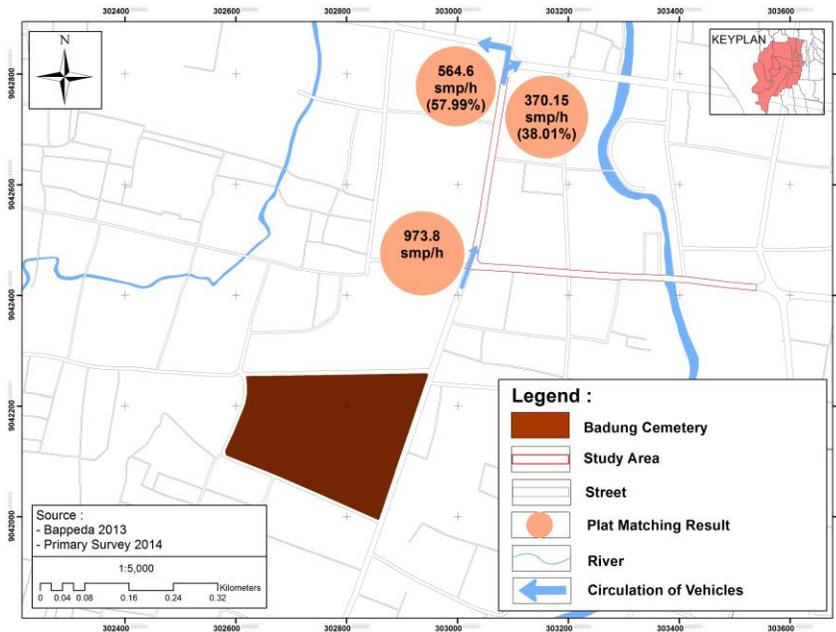


Figure 4. Map of Traffic Distribution on both Imam Bonjol Street and Thamrin Street

In table 5 and map on Figure 4, the distribution of vehicles on Thamrin Street from Imam Bonjol Street, it is found that there are two main continuous streams with the total traffic volume that dominates. Both of the continuous flows are the flow of vehicles to Wahidin Street and to Gajahmada Street.

Both of the above table and map of trip distribution are the basis of traffic management that will be performed. The continuous traffic volume is going to be the traffic volume that will be diverted and become the new load on the alternative roads. While the local traffic is assumed that still use the existing Hasanuddin or Thamrin streets as some of them destination is there or they are part of Ngaben funeral ceremony member.

### 3.6. Traffic management

The traffic management or the diversion of traffic flow is performed based on the results of field observations and analysis. Problems that occur causing the diversion of traffic flow at Hasanuddin and Thamrin Street are the buildup of traffic volume

due to the Ngaben funeral ceremony procession through these streets. In this study, the diversion of traffic flow only includes planning and setting based on the existing road capacity and DS of an alternative way, it is because the setting or traffic management in this study is temporary for which management will be performed at the time of the event or traditional procession of Ngaben. It is assumed that the driver of continuous traffic prefer to change the route, regardless distance and time, rather than to be stopped because of the funeral ceremony. The traffic management is performed for continuous flow of vehicles on Hasanuddin and Thamrin Street, while on both streets vehicles allowed are only intended for local traffic flow.

### **3.7. Traffic Assignment**

The diversion of traffic flow is performed only at the time of the event or in this case the Ngaben funeral ceremony that takes place through Hasanuddin and Thamrin Street. The diversion of traffic flow is performed based on the consideration that it is better that the continuous traffic road users choose alternative roads than should be terminated when the ceremony takes place. So that the transfer of this traffic flow is intended to accommodate the road users in selecting an alternative routes in accordance with the purpose of movement. This study is one of first effort to create a traffic management solution for such a massive urban religious activity, especially in Denpasar, Bali. Our hypothesis is with simple all or nothing method the minimum traffic impact of Ngaben will be gained. Most driver feels that Ngaben procession considered as the major cause of congestion in Denpasar. It is expected that the traffic management during Ngaben procession will make a better harmony between urban traffic activity with local wisdom of Ngaben in Bali

### **3.8. Traffic Management at Hasanuddin Street**

Traffic management at Hasanuddin Street is a traffic scenario that can be applied in the event of the funeral ceremony through Hasanuddin Street. The villages that do the procession using Hasanuddin Street include from Village Kauh Daging Puri, Puri Kangin Dauh, Kelod Dauh Puri, Puri Dauh, Daging Puri Kaja and Sub Daging Puri. The application of this management is to sterilize Hasanuddin Street and divert the continues traffic flow on Hasanuddin Street to Imam Bonjol Street, Wahidin Street and Gajahmada Street, observing that the existing road level of service is possible to be an alternative of Hasanuddin Street.

In this traffic scenario, it can be seen that the traffic management aimed to accommodate users of Hasanuddin Street to Imam Bonjol Street during the funeral ceremony in order to avoid the worst traffic jam on Jalan Hasanuddin. In this case, the existing user using Hasanuddin Street to Imam Bonjol Street will be diverted to Hasanuddin St, Sutoyo St, Sudirman St, Dewi Sartika St, Teuku Umar St, Nusa Kambangan St, and Biak Island St. This management is carried out based on the assumption that motorists or road users prefer to use these routes than to follow the

funeral ceremony which has a very low speed. The management is based on the alternative roads that have the potential to accommodate the amount of traffic volume that will be transferred. The change on the degree value of saturation that occurs on alternative roads to do this management can be seen in Table 6.

Table 6. Traffic management of moving from Hasanuddin Street to Imam Bonjol Street

Name of Street	Before Loading		After Loading	
	DS	DS	Change DS (%)	
Hasanuddin St	0.70	1.10	↑57.14	
Sutoyo St	0.65	0.83	↑27.69	
Sudirman St	0.61	0.70	↑14.75	
Dewi Sartika St	0.74	0.89	↑20.27	
Teuku Umar St	0.78	0.92	↑17.94	
Nusa Kambangan St	0.64	0.83	↑29.68	
Pulau Biak St	0.64	0.86	↑34.37	

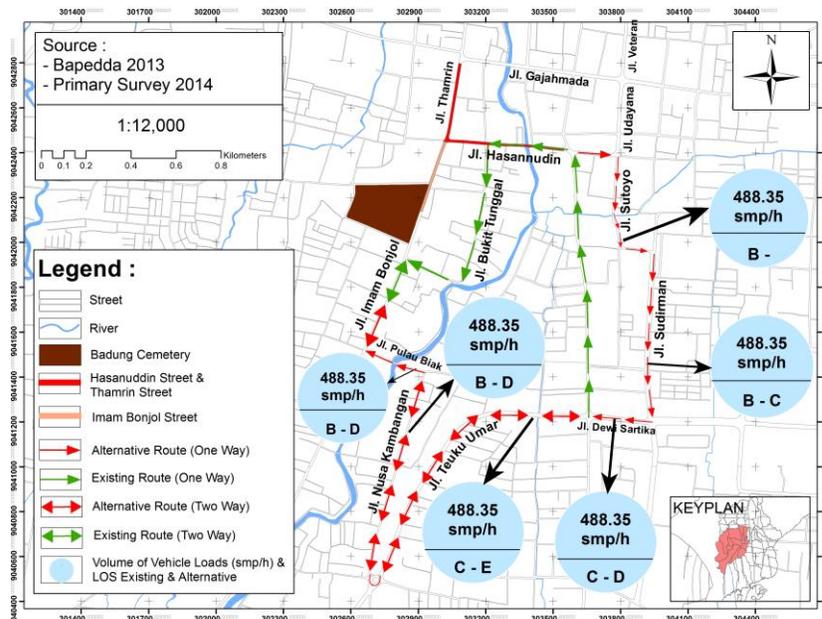


Figure 5. Map of Traffic management of moving from Hasanuddin Street to Imam Bonjol Street

In table 7, it can be seen the traffic management for road users on Hasanuddin St. to use Wahidin St. and Gajahmada St. In this traffic management, the existing road

users to use Hasanuddin St. and Thamrin St. to Gajahmada St. will be diverted to Hasanuddin St, Udayana St, Veteran St, Gatot Kaca St, Sahadewa St and Kartini St, and for road users who will go to Wahidin St, they should pass to Kumbakarna St and Sutomo St after passing Sahadewa St. On the implementation of this traffic management, Kartini Street will change direction while maintaining roads with one - way, and Kumbakarna Street will also change the flow in which the original flow of the road segment was a two-way street that will be changed into one way to increase the capacity of these roads. Table 7 also shows the change of the saturation degree that occurs in an alternative way to do this scenario.

Table 7. Traffic management of Moving from Hasanuddin Street to Wahidin Street and Gajahmada Street.

Name of Street	Before Loading	After Loading	Change of DS (%)
	DS	DS	
Hasanuddin St	0.70	1.1	↑57.14
Udayana St	0.55	0.91	↑65.45
Veteran St	0.40	0.78	↑95.00
Gatotkaca St	0.41	0.87	↑112.20
Sahadewa St	0.45	0.91	↑102.22
Kartini St	0.50	0.69	↑38.00
Kumbakarna St	0.43	0.70	↑62.79
Sutomo St	0.70	0.94	↑34.29

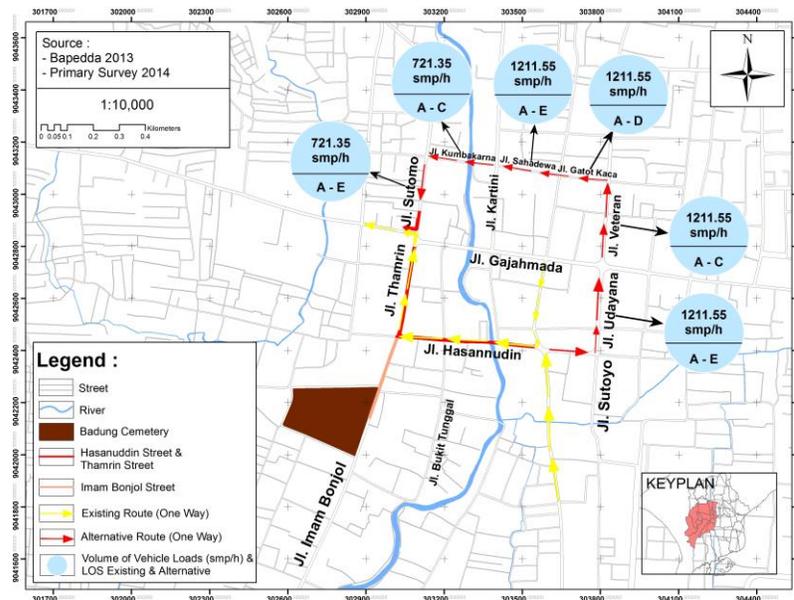


Figure 6. Map of Traffic Management of moving from Hasanuddin St. to Wahidin St.

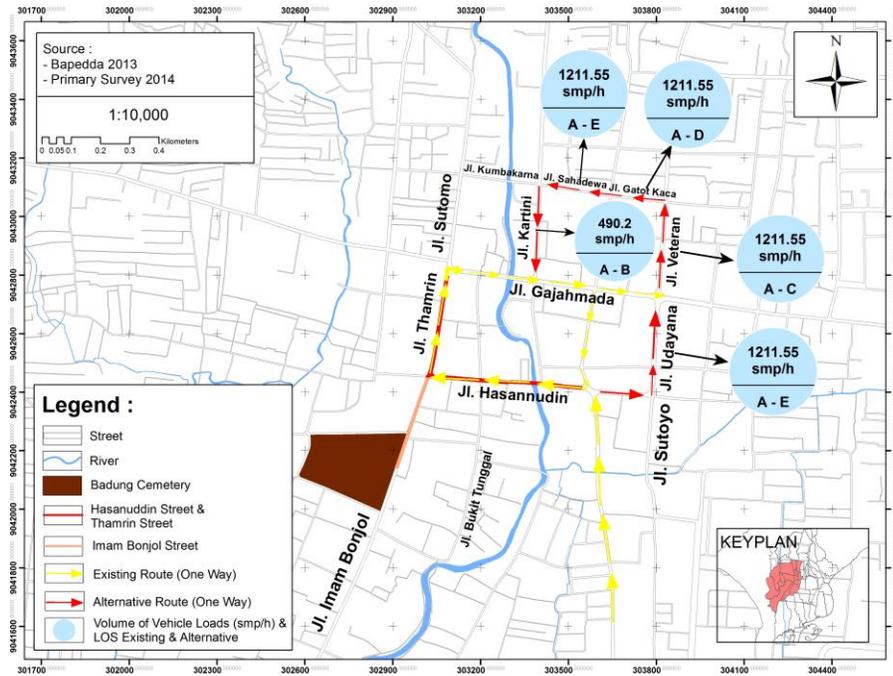


Figure 7. Map of Traffic Management of moving from Hasanuddin St to Gajahmada St.

### 3.9. Traffic Management at Thamrin Street

Traffic management at Thamrin Street is done by diverting traffic flows that are carried out during Ngaben ceremonial procession passing through Thamrin street. Based on the field observations and surveys that have been conducted related to Ngaben traffic movement patterns, the villages that pass through Thamrin Street in the process of funeral ceremonies are Dauh Puri Kaja village and Pemecutan Kaja village. In practice, this management meant sterilizing Thamrin Street from motor vehicles coming from Hasanuddin Street or from Imam Bonjol Street and divert the continuous vehicle flow that use Thamrin street by looking at the circulation of traffic flow and the existing road segment around Thamrin Street which would be an alternative way.

This traffic management aims to accommodate Hasanuddin street users and Thamrin Street to go to Wahidin Street and Gajahmada Street during the funeral ceremony. In this traffic scenario, Hasanuddin street users will be diverted to Gunung Kawi street and directly to Gajahmada street, whereas with the purpose of movement to Wahidin Street will go to Kartini street, Kumbakarna street and Sutomo street after passing through Gajahmada street. During the traffic management is underway, Kumbakarna Street which was originally a two-way street will become a one-way street to increase the capacity of the road.

Table 8. Traffic Management of moving from Hasanuddin Street to Wahidin and Gajahmada Street

Name of Street	Before Loading	After Loading	
	Ds	DS	Change DS (%)
Gunung Kawi St.	0.24	0.87	↑262.50
Gajahmada St.	0.60	0.98	↑63.33
Kartini St.	0.50	0.78	↑56.00
Kumbakarna St.	0.39	0.66	↑69.23
Sutomo St.	0.70	0.93	↑32.85

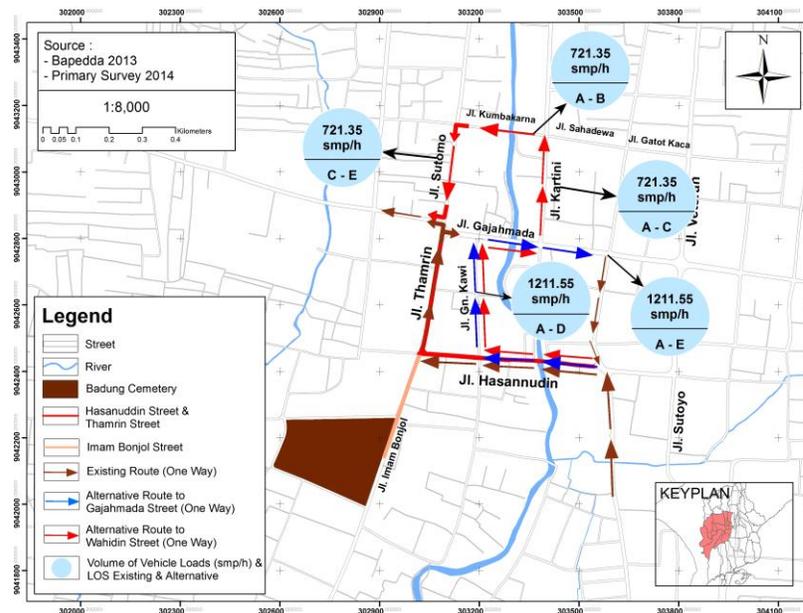


Figure 8. Map of Traffic Management of moving from Hasanuddin Street to Gajahmada and Wahidin Street

Table 9. Traffic Management of moving from Thamrin Street coming from Imam Bonjol street to Wahidin and Gajahmada Street

Name of Street	Before Loading	After Loading	
	DS	DS	Change DS (%)
Gunung Merapi St.	0.31	0.67	↑116.13

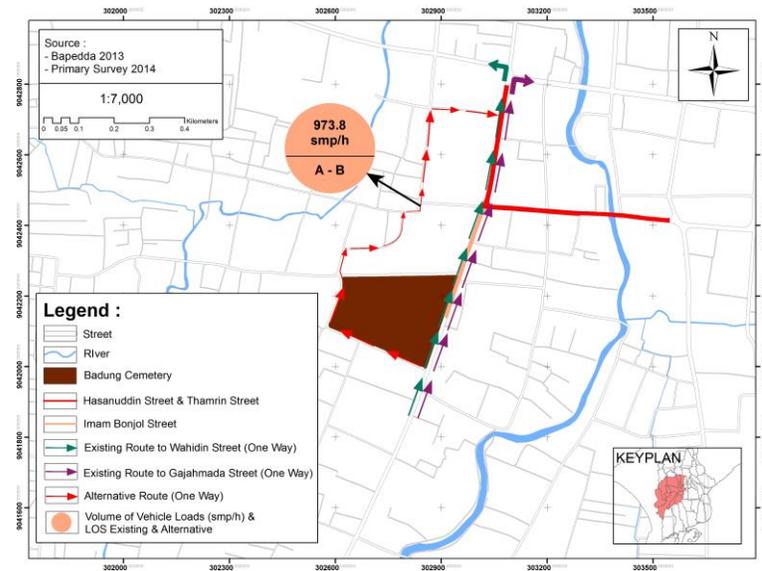


Figure 9. Map of Traffic Management of moving from Thamrin Street coming from Imam Bonjol Street to Gajahmada and Wahidin Street

This traffic management aims to accommodate users of Thamrin Street coming from Imam Bonjol Street to Wahidin Street and Gajahmada Street. This traffic scenario is a traffic management applied during funeral ceremony for those who use both Hasanuddin Street and Thamrin Street. In Figure 7, it can be seen the existing condition and traffic management that is done using the same road before heading to the movement purposes.

At the time of the funeral ceremony takes place, the road users will be redirected to the local road before Badung burial site and enter through Gunung Merapi Street and Thamrin Street.

#### 4. CONCLUSIONS

The traffic management or traffic diversion on Hasanuddin Street and Thamrin Street can be running well, by considering that the degree of saturation on the alternative roads are still less than 1. The worst degree of saturation of 0.92 reached, when the aim of moving towards Imam Bonjol, and it will become 0.94 when the aim of moving towards Wahidin Street and Gajahmada Street for Ngaben funeral ceremonies that take place using Hasanuddin Street. However, when traffic management that is done when the funeral ceremony uses Thamrin Street also shows the degree of saturation is less than 1, that is 0.93 and 0.98 with the aim of moving towards Wahidin Street and Gajahmada Street. As for users of Thamrin Street coming to Imam Bonjol meaning that when the funeral ceremony takes place either using

Hasanuddin Street or Thamrin Street shows a good degree of saturation value is 0.67, when the movement destination diverted to Wahidin Street and Gajahmada Street.

Further research and studies could be done such as the calculation of the parking arrangement in the study area that can support the traffic assignment to overcome the bottleneck of Denpasar cities main streets in general so that urban activities and local culture will work in-harmony.

This paper gives the creation of future traffic management in order to overcome the congestion resulting from the use of road infrastructure simultaneously both for traffic and religious or cultural activities. Efforts has been done in creation of traffic management in this study, although is not permanent but only at temporary, specifically during the Ngaben funeral ceremony took place which uses Hasanuddin street and Thamrin street, in the heart of Denpasar City, Bali. The paper may give a little academic contributions, however since there is no such previous study on this matter, therefore this paper may become the first attempt to study Ngaben funeral ceremonies impact to traffic, and it would become a reference for the next research-step related to such religious ceremony impact to traffic in Indonesia.

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