

PERPUSTAKAAN UMP



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A STUDY ON EFFECTIVENESS OF PEDESTRIAN BRIDGE UTILIZATION

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ABSTRACT

The study on The effectiveness of Pedestrian Bridge Utilization is to determine the factors that effecting the usage of pedestrian bridge. The effectiveness of the pedestrian bridge is depends on amount of use by pedestrian. However, they are costly and may not be used by pedestrian if not planned properly. The use rate of two pedestrian bridges was observed in the Jalan Lin Chen Mei, Sitiawan, Perak and Lebuhraya Tun Razak, Kuantan, Pahang. Three set of the data has been collected at two different location of pedestrian bridge; traffic volume survey, pedestrian volume survey and pedestrian interview survey. Volume of traffics and pedestrian crossing the roads are recorded by manual and electronically by using video camera. A survey was conducted among pedestrians using those bridges and crossing at street level. The study from data analysis has shown that the usage rate of pedestrian bridge is linearly proportionate with the traffic volume. In the present database, the frequent use of the bridge when crossing the road concerned, and seeing bridge use as time saving and safe in general were positively related to respondents' bridge use. In addition, the pedestrian bridge designs, signboards, fences, and speed of vehicle which leads to the pedestrian's comfort and safety, also play some important roles on the effectiveness of pedestrian bridge utilization. The finding from this study, there are various measures to increase the pedestrian's bridge use. Addition the site study area should be done to get the good result.

ABSTRAK

Kajian mengenai keberkesanan penggunaan jejantas adalah untuk menentukan faktor-faktor yang melaksanakan penggunaan jejantas. Keberkesanan jambatan pejalan kaki adalah bergantung kepada jumlah penggunaan oleh pejalan kaki. Walaubagaimanapun, kos pembinaan jambatan pejalan kaki adalah tinggi dan kemungkinan ia tidak digunakan oleh pejalan kaki, jika tidak dirancang dengan betul akan menyebabkan pembaziran. Kadar penggunaan dua jejantas telah diperhatikan di Jalan Lin Chen Mei, Sitiawan, Perak dan Lebuhraya Tun Razak, Kuantan, Pahang. Tiga set data telah dikumpulkan di dua lokasi tersebut; iaitu isipadu lalu lintas, isipadu pejalan kaki dan kajian temubual terhadap pejalan kaki. Isipadu lalu lintas dan pejalan kaki yang melintas jalan raya direkodkan secara manual dan elektronik dengan menggunakan kamera video. Satu kajian telah dijalankan di kalangan pejalan kaki yang menggunakan jambatan dan yang melintas jalan. Kajian daripada analisis data, telah menunjukkan bahawa kadar penggunaan jambatan pejalan kaki adalah berkadar secara langsung dengan isipadu lalu lintas. Berdasarkan data yang diperolehi, penggunaan jambatan yang kerap ketika melintas jalan, adalah disebabkan faktor penjimatan masa dan selamat digunakan mendapat respon positif daripada pengguna jejantas. Di samping itu, reka bentuk jambatan pejalan kaki, papan tanda, pagar, dan kelajuan kenderaan yang memberi keselesaan dan keselamatan kepada pejalan kaki, juga memainkan peranan penting untuk keberkesanan penggunaan jambatan pejalan kaki. Daripada kajian ini, terdapat pelbagai langkah dapat diaplikasikan untuk meningkatkan penggunaan jejantas. Bagi memperolehi keputusan yang lebih baik, kajian terhadap lebih banyak kawasan perlu dilakukan.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Pedestrian or motor vehicle crashes are a serious problem throughout the world and Malaysia has a particular problem with pedestrian death and injuries. Specifically, 711 pedestrian were reported to have been killed in motor vehicle crashes in the Malaysia in 2005. These deaths are the second highest after the driver of motorcycle. From Road Accident Statistical Report by PDRM (2005), there are 162,491 road accidents cases, with 5,712 are died. 62 percent is because negligence during crossing the roads. The popular location where most of the death, is in the middle of the road. Therefore the facilities to cross the road, like the pedestrian bridge, underpass, and zebra and pelican crossings are very important.

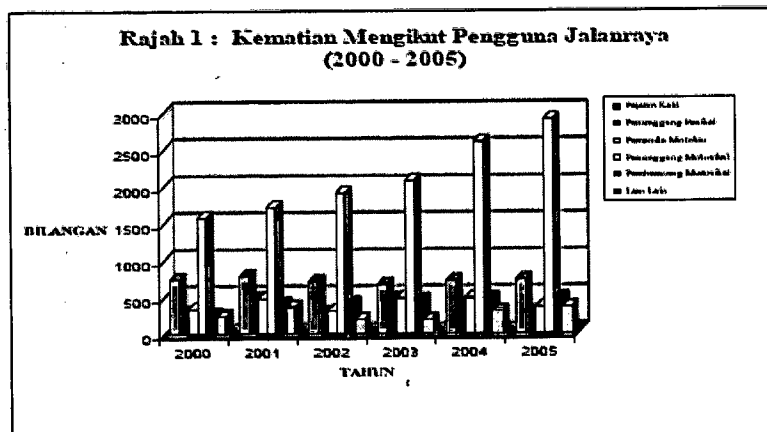


Figure 1.1: The Death according to Road User

However, not many pedestrian are willing to use those facilities. Based on Table 1.1 below, the best alternative is to construct pedestrian bridge or other facilities for pedestrian. By doing this, we are not stopping the traffic flow and at the same time, the number of accident which involved the pedestrian, can be reduced.

Table 1.1: Injuries Based on the Behaviors

Behavior	Type of injury			Total
	Death	critical	Light	
Walking/playing	141	489	653	1283
Sports	1	5	7	13
Handicap	0	13	7	20
Careless during crossing	333	918	968	2,219
Drugs	3	2	0	5
Drunk	12	10	4	26
Not using facilities	12	24	31	67
Older/crazy	31	20	24	75
Total	533	1,481	1,694	3,708

1.2 Problem Statement

Pedestrian bridge is a facility for pedestrian crossing the road. They provide security during the crossing to pedestrian. Besides that, it is high cost and requires extensive time to implement.

However, the pedestrian bridge is often ignored by pedestrians when crossing the road. Many opt for the danger of dashing across busy road despite the presence of bridges nearby. Therefore the provision of pedestrian bridges does not achieve a real function and is detrimental to the authorities who provide it. In addition, the smoothness of traffic is also disturbed by the presence of a pedestrian who crossing at will. This means that while motorists enjoy uninterrupted flow, pedestrians have to climb about 30 to steps to go up and take another 30 steps to go down.

The condition of pedestrian bridges plays a role in attracting people to use it. Pedestrian bridges in study case are in good condition and comfortable, but still of them not willing to using it and may be the other factors that influence them to not use it.

Pedestrians tend to choose the quickest way to reach the destination. As factors to be fast, then their personal safety is often ignored. We often hear is complaints about the behavior of the driver of this pedestrian. This is because many pedestrians ignore traffic conditions when they want to pass that will interfere with other road users. Therefore, facilities for pedestrians are very important. The best method is to provide a pedestrian bridge.

Pedestrian flow and density of traffic volume is closely related to the use of a pedestrian bridge. Pedestrians will be crossing without the use of facilities such as pedestrian bridge to find that the road was not so busy.

Therefore, all the problems that arise with the use and conditions pedestrian bridges will be made. In addition, the proposals will be formulated based on accumulated data.

1.3 Objective

In this study, the objectives have been identified which will guide in conducting this study. The main objectives of this study are:

- i To determine factors effecting the usage of pedestrian bridge
- ii To propose measures to step up the utilization of pedestrian bridge

1.4 Scope of Study

This study will provide a comprehensive picture of the pedestrian bridge as a convenience for pedestrians. The aspects will be covered in this study are as defined pedestrian bridge, pedestrian types available, the rational needs of pedestrian bridges, appropriate placement and level of safety provided. The use of pedestrian bridges and pedestrian flow are also examined to obtain a clear view of the effectiveness of the provision of this pedestrian bridge. In addition data of traffic volume and pedestrian volume will be collect at the location which has existing pedestrian bridge within and analyze based on observation and interview with correspondence especially pedestrian.

This study covers the following aspects:

- i. Choose two areas of main pedestrian users in Sitiawan, Perak and Kuantan, Pahang.
- ii Conduct research and obtain information needed to determine the appropriate method is used.
- iii. Analysis and comparison of methods of work.

1.5 Study of Area

Study area selected for the study of this pedestrian bridge is in Sitiawan, Perak and Kuantan, Pahang. The selected areas are the focus areas of the consumer to walk in. To obtain better results, the study of more study area needs to be done. The areas selected in this study are:

- i Jalan Lin Chen Mei, Sitiawan, Perak
- ii Lebuhraya Tun Razak, Kuantan, Pahang

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The pedestrian bridge is one of the elements in the system path for pedestrians. Pedestrian bridges are, for the use of pedestrians to cross busy roads with vehicles. In addition, the pedestrian bridges can be considered as a tool or crossing facilities the safest and most efficient for pedestrian. It is a form of segregation between pedestrians and vehicles on the road.

Provided pedestrian bridges should be able to attract the attention to use when are crossing. This is because many pedestrians often feel reluctant to use the pedestrian bridges provided by the authorities. Although the time taken by pedestrians is more or less the same when using the pedestrian bridge or not to use when crossing road. Sometimes, pedestrian take longer to cross without using the pedestrian bridge.

To ensure that pedestrian bridges are provided to give the maximum return that corresponds to the cost incurred to build, then it should be located in strategic areas and where users do not have to walk far to use it.

Therefore, the pedestrian bridge plays its own role in reducing the accident rate involving pedestrians crossing the road, especially at the time. In addition, obstacle such as a fence built along the road leading to the pedestrian bridge is

intended to prevent pedestrian from crossing the road without using pedestrian bridges that have been provided.

2.2 Definition of Pedestrian Bridge

Definition of the word or true means of pedestrian bridges are necessary to know that this study can be well understood. Therefore, it is necessary to understand and will dominate the real purpose of the pedestrian bridges to study and know the problems associated with the preparation of this pedestrian bridge.

Followed from the technical aspect, pedestrian bridge or 'footbridge' as defined by the Dictionary of Scientific and Technical Term that are authored by Daniel N. Lapades refer pedestrian bridge as; Footbridge- a bridge for people on foot only. According to Tamio (1991), this is the best solution for the pedestrians to cross the road. Normally there are 2 types i.e. overhead footbridge and underpass but the most common in Malaysia is overhead.

Therefore, the definition has been referred to imagine pedestrian bridge as a small bridge which are designed and used solely for pedestrian use only.

2.3 Use of Pedestrian Bridge

As we already know, pedestrian bridge provided in order to facilitate pedestrian risked his own, by crossing the road without using the pedestrian bridge.

Therefore, a more careful control is needed to determine who made ready pedestrian bridge fully used. Pedestrians normally will use the pedestrian bridge at the following condition;

- i They are aware of the dangers that will befall them when crossing the road with a lot of vehicle flow and speed.
- ii. When they have to wait long to cross a busy road.
- iii There is traffic enforcement officer who will impose legal action if there is a pedestrian crossing without using the pedestrian bridge.
- iv Walkers who cannot afford to move quickly to cross busy roads such as old aged and disabled physical.
- v Vehicle flows very busy and fast-moving vehicle in which it is difficult to pass without an accident.

Usually the footbridge is constructed across the road with higher volume of traffic and pedestrians crossing the road. The objective are for the safety of the pedestrians and to maintain the traffic flow. According to Tamio (1991), the decision to build a footbridge based on the width of the road, traffic volume and the numbers of pedestrians crossed the road. But in other the footbridge is needed even though the demand was low.

2.4 Pedestrian Safety

The most influential factor in making a decision to cross at a designated crossing location is the distance of the crosswalk to desired destinations of pedestrians (Handy, 1996). Also it is evident that pedestrian safety can be affected by changes in the signal settings at signalized crosswalks (pedestrian delay < 40 sec) (Garter, 1989).

2.5 Pedestrian Crossings

It has been well documented that most pedestrian collisions occur when pedestrians are crossing a road, and most research finds that risk is much higher away from crossing facilities compared with on a crossing (AA Foundation, 1994 and Ghee et. al, 1998). National statistics show that approximately 40% of pedestrian collisions in 2003 occurred whilst the pedestrian was crossing the road away from a pedestrian crossing (Department for Transport, 2004). Only 9% of pedestrian collisions occur on a pedestrian crossing and nearly 8% occur within 50m of a crossing (Department for Transport, 2004). National figures suggest that more collisions occur at mid-block signalized crossings compared with other types of pedestrian crossing (such as zebra crossings, signal-controlled junctions and crossings with human control e.g. school crossing patrols) (Department for Transport, 2004). This, however, may be misleading as it takes no account of the numbers of each type of crossing. It has been argued that the use of signalized crossings halves the risk compared with crossing without these facilities (AA Foundation, 1994), and that the lack of crossing facilities affects older women more than anyone else as they were found to have difficulties understanding and monitoring the sequence of traffic movements and a tendency to monitor nearside and far side traffic independently as they cross the road (Ghee et. al, 1998). In terms of collisions that do occur at crossings, one study has shown that the flashing pedestrian green phase at Pelican crossings has high collision rates (Ghee et. al, 1998).

2.6 Type of Road

National statistics show that most pedestrian collisions occur on built-up roads (96%), that is roads with a speed limit of 40mph or less (Department for Transport, 2004). It should be noted that these figures do not take in to account exposure, and therefore it is possible that risk is not higher, but that there are higher pedestrian flows on, for example built-up roads with speed limits of 30mph or less.

Research conducted by the AA Foundation (1994) found that in their study area, the highest proportion of pedestrian casualties occurred on 'District Distributor' roads which were A or B roads with speed limits of 40mph or less.

According to one study, road width plays an important part in collision risk, with risk increasing with the width of the road (MVA, 1999).

2.7 Pedestrian Attitude and Behavior

Pedestrian behavior is regarded by many authors as being important for explaining why pedestrian collision occurs (Roberts, 1997). By Sleight (1993), understand and know clearly the purpose of a person crossing the road or walking in general, are not directly provide information in planning to provide pedestrian crossings and space in certain areas. Anuj Kumar Gupta (2005), also of the opinion that the design of pedestrian walkways should be based on consumer characteristics through the route. For example, walking in the center of the elderly will affect different than walking in the area of university students. Route in the center of the elderly should be designed according to the nature of piety running gold, but the route is designed based on the nature of the university students walking to produce better movement.

2.8 Effects of Traffic Volume

Crossing in light traffic is generally regarded by pedestrians as a safe action therefore they will not choose to cross at a designated crossing facility if they feel it is safe to cross where it is more convenient to them (Garder, 1989, Daff et. al, 1991, Yagil, 2000). Pedestrians who said they always use signalized crossings gave safety and busy roads and traffic as reasons for doing so (Daff et. al, 1991). American research has shown that commuters are more likely to risk crossing at no designated

crossing points than occasional users and did so because they perceived no risk in doing so, for example there was light traffic (Sisiopuki and Akin, 2003). It is also likely that they will be very familiar with their route and the traffic environment and will therefore feel more comfortable in taking risk.

2.9 Effects of Pedestrian Physical Impairment

Pedestrians who are impaired in a particular way e.g. in a wheelchair, using crutches, carrying heavy bags etc. are likely to take longer to cross the road, feel more vulnerable, and therefore choose to cross at marked crossings. Little research has been found on this issue, however a study conducted by Daff et. al (1991) in Australia found (through video observation and group discussions) that pedestrians carrying a heavy bag were more likely to cross at a signalized crossing.

2.10 Pedestrian Facilities

Began in the 1990s the preparation and construction of facilities for pedestrians has become an important matter. Facilities provided must ensure the safety and comfort of pedestrians. Public researchers, especially since the 1990's found that the planning, financing and maintenance of pedestrian facilities should be done in more detail. Among the places frequented or used by pedestrians are crossing signal lights, zebra crossing, hawkers, pedestrian bridges, and tunnels.

(Transportation Equity Act of 21st century) or TEA-21 suggested that the road construction project to consider the provision of pedestrian facilities, except in places where there is no pedestrian facility needs.

The design and construction of facilities for pedestrians, various features and criteria has to be considered. It is important to provide a pedestrian facility that meets

the needs of consumers for each age sex. Pedestrians from each age and gender will require the speed of their journey is different. In addition, the flow of pedestrians in the area also plays an important role in the preparation of the construction of pedestrian facilities more effectively. For example, the acreage and the time taken by the user that runs alongside are different than walking alone. As such, it can be said that the increase in velocity causes the density of pedestrians walking down. Therefore, an important criterion in determining the time required crossing by pedestrians.

Pedestrian flow and the velocity are dependent on time, condition, weather and travel purposes. At peak pedestrian flow is high, causing reduced walking speed. Some of the pedestrian facility users are users with disabilities. Therefore, the design of pedestrian facilities should also take into account the criteria for people with disabilities to provide comfort and safety of this group when crossing the road.

Children and the elderly is also a component of an important of pedestrian facilities. Pedestrian velocity lowers than the age of children middle-aged adults. Therefore, consideration of the time taken by a person aged to cross the road is longer than younger people. Other than that, most of the elderly have vision and hearing problems, this can lead to their response to things is slow.

In addition, the pedestrian needs are different for each area. In town, pedestrian flow is higher than rural areas. This is due to urban areas with dense settlements, workplaces, schools, colleges, and a lot of shopping.

Residents typically use pedestrian facilities for the various destinations and purposes such as to work, appointments, recreation and shopping. Parking facilities that are less and also advances in technology transit systems cause an increase in pedestrians. Therefore, a system of pedestrian facilities more effectively and in accordance with the requirements of pedestrians should be provided.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

This chapter discusses the study design, the method in which the study was conducted and data collection methods, equipment required and the use and location of study.

This study involves the observation and analysis with respect to the characteristics of the pedestrian. It aims to produce information that can be used as guidelines and criteria to be considered in planning, designing and maintaining pedestrian facilities and so overcome the problem faced by pedestrians.

This chapter will explain more about conducting this study from start till the end. The purpose of this study is to determine the factors affecting the usage of pedestrian bridge and to propose the measures to step up the utilization of pedestrian bridge. Methodology for this study is divided into four stages according to the stages of this study. Stages of this case are;

a. Stage 1:

At this stage is made where the synopsis is to express the problems associated with pedestrian bridges and the formation of objectives.

b. Stage 2:

It is the stage at which the preliminary study made which involve the collection of data. At this stage was also carried out surveys in the form of interviews and observations in the study area.

c. Stage 3:

This is the stage at which the analysis of information collected is made. Analysis made important because of where the forecasts and recommendations can be formed.

d. Stage 4:

In this stage, after completion of the information collected was analyzed, then the proposals are considered suitable will be made then the overall conclusion will be formulated.

The flowchart of the methodology has shown in Figure 3.0.

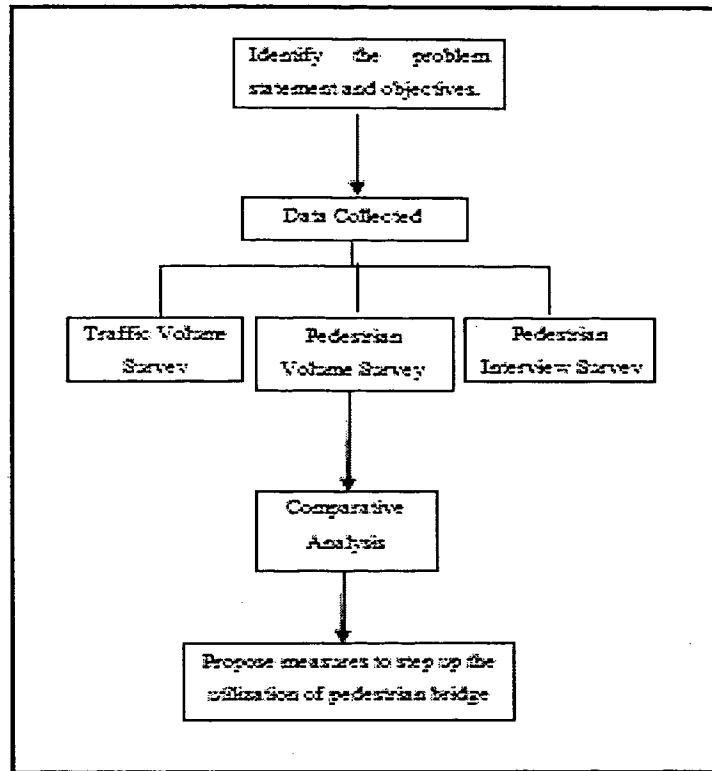


Figure 3.1: Flow Chart of Methodology

3.2 Site Visit

This activity is to choose the location. Firstly, identify how many and where the pedestrian bridge has installed at the area of Sitiawan, Perak and Kuantan Pahang. This is very important to identify the suitable location based on time allocated, environment and others. Plus to make sure the research will give positive results.

3.3 To Decide the Locations

A few criteria to decide; location near school, shopping complex and office building or premises, and residential area.

3.4 To Determine Suitable Time

The best to choose the location is based on the number of pedestrians using the pedestrian bridge. The day is Tuesday at Jalan Lin Chen Mei and Wednesday at Lebuhraya Tun Razak This because is working and schooling day. There are 2 times would be select; peak hour (12pm-2pm) or (4pm-6pm) and off-peak (7am to 9am). The period are 1 hour each time.

3.5 Data Collection for Pedestrian (Using and Not Using pedestrian bridge)

Data will be collected manually within two hour for two different time; peak hour and off-peak. For the pedestrian who cross the road outside 50 meter from the pedestrian bridge will be recorded as not using the footbridge.

3.6 To Determine Traffic Volume

The traffic volume also will be recorded concurrently with pedestrian by use the video camera. Then, count the total number of vehicles. There are divided into 5 main categories; motorcycles, car, van, small lorry and heavy vehicles/bus.

3.7 Pedestrian Interview Survey

These method is to classify the pedestrian bridge user's and what the rank of the usage of pedestrian bridge. Then, this method will be proceed with distributed the questionnaire to pedestrian to get the feedback from them about this facilities. From this questionnaire with the respondents' background information recorded directly in the study area. From this questionnaire, we can know the purpose of walking. Background information on the study was gender, age, and occupation. After that,

the survey forms were analyzed for the factors that influence pedestrian walking in urban areas.

3.8 Comparative analysis

This stage is the stage which the analysis of information collected is made. Analysis made is important because of where the forecast and recommendation can be formed. The result at both location will be compare identify the factors that effecting utilization of pedestrian bridge.

3.9 Propose measures to step up utilization of pedestrian bridge

In this stage, after completion of the information collected was analyzes, and recommendation as it deems fit to be made. Of the proposal overall conclusion will be formulated. A few steps and effective correctives measures will be highlited to increase the utilization of pedestrian bridge.