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Lighting, Public Transport and Fear

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Abstract: Having known one of the very simple function of lighting is to light the area, therefore failure to consider ample lighting on the street, pedestrian and waiting area such as bus stop and terminal will increase the fear level among commuters especially women. Though women travelling pattern differ in so many ways as compared to men, their needs must first be address in enhancing their level of safety while travelling. This study will highlight the issue of lighting provision especially on the street pedestrian walkways and bus stop lighting provision that will leave an impact towards women feeling of safety and and fear.

Key words: Lighting, fear factor, public transport, travelling pattern, pedestrian walkways

INTRODUCTION

Sideris highlight that while the relationship between women's fear of crime and public space has been the focus of considerable research, transit environments have always received less attention especially on the infrastructure provision while travelling. This include street lighting, lighting at the pedestrian walkways and lighting at the waiting area such as bus stop and terminal. It is also believed that within any urban area setting, women have inferior access to both private and public means of transport. This situation is worse when women have a higher share of their household's travel burden. Since, women are considered as the most vulnerable group of travellers especially towards the crime occurrence, an urgent attention is needed especially on the allocation and design of the infrastructure to aid their travelling activities. Data was collected through quota sampling technique where a stated preference passenger surveys were being carried out in Kuala Lumpur urban area. Result from the major discussion on the literature showed that most women feel insecure or feel unsafe while walking to and from the bus stop without ample lighting and waiting at the unlit bus stop.

When travelling is concern, it involves several travel component in which infrastructure is one of the important component that a travellers had to deal with in order to complete a journey. Providing a practical infrastructure does not benefited a group of women travellers only but it will also create lots of continuous benefit towards the rest of the society as the provision of the infrastructure would be used by all users. This will include the disable users as well. Using a sample of working women commuters who used the infrastructure on daily basis, the study proceed to look at the effect on the level of safety if they indicated higher level of dissatisfaction towards the current infrastructure design being provided to them. Among all the infrastructure provision provided to them, lighting is one of the element which had been identified as the most dissatisfied among the women travellers.

Sumaedi *et al*. (2012) had stated that the behavioral intentions of a public transport travellers have been much discussed not only in marketing literature but also in transportation industries. This is because they believed that any behavioral intention is the act of consumer satisfaction on a service or product that they experience.

MATERIALS AND METHODS

Measuring the lighting provision through satisfaction indication level: According to Johnson *et al*. (1995), satisfaction refer to a cumulative construct that is affected by a market expectations and performance perceptions in any given period. An indication of satisfaction is also affected by past satisfaction from period to period. It is clear from the definition that a customer satisfaction lies

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in the disconfirmation of customer expectation paradigm, whereas a positive disconfirmation leads to customer satisfaction and negative satisfaction leads to customer dissatisfaction (Ismail *et al*., 2006). In services industry, since satisfaction brings a lot of benefits to organizations and in particular to a transport stakeholders, it has been widely identified as a key intermediary objective in every angle of the operational aspect (Ranaweera and Prabhu, 2003). Among the key benefits being identified is that satisfaction is generally seen as the main driver of customer's favorable behavioral intentions. Therefore in this study, every passengers were ask on their satisfaction level using the current lighting provision.

Apart from highlighting the quality issues of the infrastructure design provision, the previous literature has also discussed the major contribution of the infrastructure design towards the criminal behavior or crime incident. Numerous studies have attempted to explain that poor provision of the infrastructure would increase the risk of criminal activity.

The growing of literature on infrastructure provision started to be discussed critically in 1980's. Morris further identified that both men and women, young and older people felt most unsafe after dark waiting or walking to and from the bus stop. However, he pointed out that the majority of the respondent felt secure while being on bus as compared to the waiting environment or when walking to and from the stop. Hence, the study concluded that the quality of the traveling environment had been highlighted by bus users as an important factor influencing fear of crime. Poor maintenance of public infrastructure such as graffiti, vandalism and litter along the way to and from the stop and at the station itself signaled to the users that the place was in poor supervision and lack of control in which it created high feeling of fear.

To further look into the matter, Benjamin *et al.* (1994) investigated the differential impact of infrastructure provision and maintenance in Worcestershire. Using a stated preference survey of bus commuters, he found that the good maintenance and upkeep of transport facilities were identified as key issues for enhancing perceptions of personal security among the bus riders. In his review of infrastructure provision surrounding the transport services, he also revealed that isolated bus stops and un-staffed station deterred potential public transport users and increased use of private car.

One of the successful case studies in Liverpool bus station area indicated that the station was a place where people felt unsafe before. According to Prendergras many avoided the station whenever they could, especially outside off peak travelling times and at night. Although, there was little actual crime, the station was frequently dark and deserted which added to people's fear. However, after the station had been turned around by an upgrading of the station which include improved lighting, replacement of low-growth shrubs with single stem trees to improve sight lines, implementation of regularly monitored close circuit television and opening of restaurant and retail shop nearby had significantly reduced the feeling of fear among the bus passengers especially women and thus increased the number of people using the station. Prendergrast also revealed that there has been a 14% increase in the number of bus passenger in the morning and 17% increase in the afternoon peak. But even better was the massive 77% increase use after 6 p.m. While it was being acknowledged that the increase was because of the longer working hour in the city centre but it was still believed that the increase was because people felt much safer. The study concluded that the qualities of the infrastructure design that had been highlighted by public transport users as important factors influencing fear of crime.

However in 2015 a group of researcher, Steinbach *et al.* (2015) who looked at data on road traffic collisions and crime in 62 local authorities in England and Wales found that lighting had no effect on crime. This include whether authorities had turned them off completely, dimmed them, turned them off at certain hours or substituted low-power LED lamps. They also summarize that streetlights don't prevent accidents or crime, but do cost a lot of money.

Early study done by Morrow and Huston (2004) in Chicago had indicated that there is a widely held belief in the law enforcement community that improved street lighting will reduce both the fear of crime and the actual incidence of crime. They further stated that this belief is based on the view that improved visibility will increase the possibilities for the identification and the apprehension of criminals as well as provide solace to those people who fear for their safety. Thus, they conclude that there is no solid evidence has yet been found to support the hypothesis that improved street lighting reduces reported crime. Apart from that their study also mentioned that although some studies show reductions in nighttime crimes relative to daylight crime with the inclusion of street lighting, the overall effect has not been found to be significant. However, the public often welcomes increased street lighting as a possible deterrent to crime in their area.

RESULTS AND DISCUSSION

On the question of whether infrastructure provision especially the lighting had an effect on women level of safety, the study found that those who indicated a higher level of dissatisfaction towards the infrastructure provision in their area, tend to rate a higher level of unsafe while travelling on the whole journey. As depicted in

Table 1: Mean score analysis on lighting provision

Lighting attributes	Mean scores
Current street lighting	1.93
Surrounding lighting	1.88
Placement of lighting	1.61
Walking during day time	3.17
Walking during night time	1.97
Waiting at the stop-night time	1.43
Waiting at the stop day time	2.70

*1: Very dissatisfied; 7: Very satisfied

Table 2: Percentage satisfaction on the current lighting position

Lighting attributes	Dissatisfied	Moderate	Satisfied
Current street lighting	75.9	18.3	5.8
Surrounding lighting	78.2	15.7	6.1
Placement of lighting	85.6	8.3	6.1

Table 3: Percentage satisfaction on the walking and waiting condition using current lighting system

Lighting aattributes	Dissatisfied	Moderate	Satisfied
Walking during day time	7	68.9	24.0
Walking during night time	84.3	3.8	11.9
Waiting at the stop say time	20.5	65.1	14.4
Waiting at the stop-night time	84.3	15.1	0.6

Table 1, the result indicated that most of the current infrastructure design was rated as dissatisfied by the daily women bus commuters. What was interesting in this data was that the most dissatisfaction towards the infrastructure provision was on 'street lighting' and 'bus stop lighting'. This finding has important implications for developing a sustainable transport infrastructure provision where allocation of ample lighting to brighten up the walking area and waiting area should be given a top priority in enhancing the level of safety among the bus commuters.

Mean score analysis in Table 1 highlight the current satisfaction of lighting provision among the stage bus travellers. The most dissatisfaction towards the lighting attributes were being indicated through waiting at the stop during night time (1.43). This was followed by a dissatisfaction on current placement of street lighting (1.61) and current street lighting with a mean score of 1.93.

Table 2 further analyse the frequency analysis on the current satisfaction of the lighting provision while travelling in urban area. A total of 85.6% had indicated that they were dissatisfied with the placement of lighting. This was followed by 78.2% who had indicated a high dissatisfaction towards the surrounding lighting and followed by 75.9% who had stated a high dissatisfaction on the current street lighting. This result might explain that current placement of lighting is not ample for them to feel safe while traveling especially during night time where the area is dark. The material used in current surrounding lighting could be change to create a better bright area to lit up the area in order to enhance the level of safety indication among the travellers.

Table 4: Correlation analysis between lighting and feeling of safe

Variables	Lighting	Feeling of safe
Lighting		
Pearson correlation	1	0.046
Sig. (2-tailed)		0.422
N	312	312
Feeling of safe		
Pearson correlation	0.046	1
Sig. (2-tailed)	0.422	
N	312	312

Table 5: Regression model-lighting and fear of crime

Model	R	R^2	Adjusted R^2	SE
1	0.355[a]	0.126	0.123	4.30088

[a]Predictors: Constant, lighting; [b]Dependent variable: fear of crime

Table 6: ANOVA[a]

Model 1	Sum of square	df	Mean square	F-value	Sig.
Regression	828.053	1	828.053	44.766	0.000[b]
Residual	5734.242	310	18.498		
Total	6562.295	311			

[a]Dependent variable: fear of crime; [b]Predictors: constant, lighting

Table 7: Coefficients[a]

Model 1	Unstandardized coefficients (B)	SE	Standardize coefficients (β)	t-value	Sig.
Constant	69.096	0.674	-0.355	102.544	0.000
Lighting	-0.461	0.069			0.000

Table 3 further analyse on the percentage of satisfaction indication on lighting provision while walking and waiting at the stops. The result shows that 84.3% of the total respondent had indicated that they are dissatisfied with the lighting provision during night time and while waiting at the stops. One of the possible explanation for this scenario is that, during night time a bus travellers especially women need more lighting for them to feel safe to travel. A correlational analysis between lighting and feeling of safe were being carried out to obtained a better understanding of the lighting and the effect on the feeling of safe of a women travellers.

This results shows that a significant correlation exits between lighting and the feeling of safe of a women travellers. A positive value of correlation analysis indicate that there is a positive correlation between lighting and feeling of safety among the travellers. Improvement in the lighting system could increase the feeling of safe and reduce the feeling of fear while travelling (Table 4).

Table 5 provides the R and R^2. The R value in this model represent a simple correlation between lighting and fear of crime and is 0.355 which indicates a positive degree of correlation. Where as the R^2 value shows that 12.6% of the total variation in the dependable variable (fear of crime) can be explain by the independent variable (lighting).

Table 6 and 7 further shows the statistically significance of the regression model that was run. Here, when the $p<0.0005$ which is <0.05, this indicates that

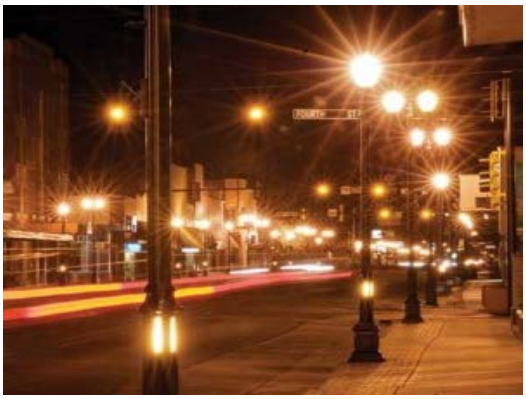

Fig. 1: Ample lighting increases feeling of safety

Fig. 2: Roadway lighting

overall, the regression model statistically significantly predicts the outcome variable such as fear of crime (i.e., it is a good fit for the data).

Final regression equation:

$$\gamma = \alpha + B_1X_1 + \varepsilon$$

$$\gamma = 69.096 - 0.461X_1 + \varepsilon$$

Figure 1 shows the installation of lighting that will increase the level of safety of a public transport traveller in the city centre. These strategies could be installed in Malaysia urban area. Another recommendation that we could consider is the installation of lighting on the road side that will create sense of safety while using the infrastructure even during off peak hours. Other than that we should also consider an ample lighting at the bus stop. In order to create a higher feeling of safe among the public transport users (Fig. 2 and 3).

Fig. 3: Well lit bus stop

CONCLUSION

It is generally accepted that adequate, efficient and most importantly a safe infrastructure provision are essential for most urban dwellers especially women commuters. As developing countries like Malaysia strive to increase their level of infrastructure provision, safety issues seldom being put into top priority that had constitutes towards a higher feeling of 'unsafe' and 'fear of crime' to most women. The main contribution of this research is the analysis of the level of safety indication given a poor or dissatisfied infrastructure provision especially on the lighting provision to aid the travelling activities. The result shows that to be able to achieve a practical and ideal travelling among urban commuters, proper allocation of lighting is important especially at the walkways and the waiting area such as bus stop. This will towards the end increase their behavioral intention to continue travelling using a public transport when commuting into city centre is concern. Failure to address the appropriate infrastructure design needed by these group of people would further reduce the travel of demand using a public transport as they will perceived as unsafe.

RECOMMENDATIONS

Even brighter does not mean safer, lighting on the street should be improved regardless of whether is reduces the crime occurrence in the urban area or not. This is because having a bright area to walk and wait will create a greater sense of feeling safe to use public transport in the city centre. It is important to tap on the feeling of safe rather than the actual crime because the feeling of safe will determine the behavioral intention for the trip generation using public transport.

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