AN ASSESSMENT OF THE EFFECTS OF ROAD HUMPS ON TRAFFIC SPEED AND NOISE IN THE RESIDENTIAL AREAS

BY

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A thesis submitted in fulfilment of the requirement for the degree of Master of Science (Built Environment)

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JULY 2019

ABSTRACT

The installation of road humps in residential areas have calmed residential roads as they seem to have reduced the traffic speed along these roads. However, at drawback of road humps installation is that they cause nuisance due to the noise and vibration produced by the sudden acceleration and deceleration of vehicles. This study evaluates the effects of road humps on traffic speed and noise level in residential areas. The study was conducted for two different sets of road humps in Taman Setiawangsa and Keramat and measurement of the road humps and road profiles were done for each road. The speed of each vehicle and noise levels at selected points were measured by using a radar gun and noise level meters. The sample size for spot speed was determined by using a systematic sampling technique based on the collected 12-hour traffic volume survey done earlier. Satisfaction and perceptions of residents on traffic speed and noise were conducted through face to face interviews with randomly selected residents by using simple random sampling. Data were analysed using descriptive statistics, which described the changes in vehicles speed and noise levels along the selected roads, as well as taking into account the patterns of speed and noise levels. The differences in mean for both speed and noise levels were analysed by using T-test while correlation analysis was used to analyse the relationship between speed and noise level. As for the questionnaire data, descriptive analysis was applied to identify the residents' demographic and socioeconomic background while cross tabulation analysis was used to evaluate the perceptions and satisfaction of the residents. As expected, the results of the speed survey showed that the highest speed recorded was along Jalan Keramat with 28.75 km/h and the lowest was Jalan Setiawangsa 21, 14.35 km/h. Meanwhile, the highest noise level, 72.36 dB was recorded along Jalan Keramat and the lowest, 57.88 dB was recorded along Jalan Setiawangsa 21, affected by road humps characteristics, particularly height and width of the humps, have influenced the speed produced by the vehicles. This showed the significant relationship between traffic speed and noise and verified that the increase in speed resulted in high noise levels. It was found that the relationship between traffic speed and noise level was significant as the noise level was affected by the accelerating and decelerating vehicles, apart from being influenced by the road and hump profiles as well as the types of vehicles involved. The findings on significant changes showed that road humps were effective in reducing speed, but the results on traffic noise produced was on the contrary. As for the questionnaire survey results, most residents were satisfied that road humps functioned well in reducing traffic speed compared to traffic noise. The residents also expressed their dissatisfaction towards traffic speed and noise in their residential areas. However, this study only assessed the effects of road humps on traffic speed and noise levels in residential areas, by comparing different roads and road hump profiles. Further study can be done by considering other factors such as traffic volume. The expected findings can be a basis in solving issues on traffic speed and noise in residential areas including the execution of road humps in new residential developments.

ملخص البحث

ساهم تركيب حدب الطرق في المناطق السكنية في تهدئة الطرق السكنية حيث يبدو أنه يُقلل من سرعة حركة المرور في الطرق السكنية. ومع ذلك ، فإن من عيوب تركيب حدب الطريق هو تسبُّبه في توليد إزعاج بسبب الضوضاء والاهتزازات الناتجة عن التسارع والتباطؤ المفاجئ للسيارات. تقوم هذه الدراسة بتقييم آثار حدب الطريق على سرعة المرور ومستوى الضوضاء في المناطق السكنية. أجريت الدراسة على مجموعتين مختلفتين من حدب الطرق في تامان سيتياوانجسا وكيرامات، وتم أخذ كُل من قياسات حدب وملامح الطرُق لكلٍ من المنطقتين. تم استخدام بندقية الرادار ومقياس مستويات الضوضاء لقياس سرعة كل سيارة ومستوى الضوضاء في نقاط محددة. تم تحديد حجم عينة السرعة الفورية باستخدام أسلوب أخذ عينات منهجي يعتمد على مسح حجم حركة المرور الذي تم جمعه لمدة 12 ساعة في وقت مسبق. بعد ذلك ، تم أخذ نسبة الرضا وتصورات السُّكان حول سرعة المرور والضوضاء من خلال مقابلات معهم وجهاً لوجه وقد تم اختيارهم عشوائيًا عن طريق استخدام أسلوب العينة العشوائية البسيطة. تم تحليل البيانات باستخدام إحصائيات وصفية ، والتي وصفت التغيرات في سرعة السيارات ومستويات الضوضاء في الطُرق المحددة ، وكذلك أنماط السرعة ومستوى الضوضاء. تم تحليل الاختلافات في المتوسط لكل من السرعة والضوضاء بينما تم استخدام تحليل الارتباط لتحليل العلاقة بين السرعة ومستوى الضوضاء. T باستخدام اختبار أما بالنسبة لبيانات الاستبيان ، فقد تم تطبيق التحليل الوصفي لتحديد الخلفية الديموغرافية والاجتماعية .والاقتصادية للسُكان، في حين تم استخدام تحليل الجدولة المتقاطعة لتقييم تصورات ونسبة رِضا السكان كما كان متوقعًا ، أظهرت نتيجة مسح السرعة أن أعلى سرعة مسجلة كانت في جالان كيرامات بمسافة 28.75 كم /ساعة وأدنى سرعة كانت في جالان سيتياوانجسا 21 ، 14.35 كم / ساعة. وفي الوقت نفسه ، تم تسجيل أعلى مستوى للضوضاء وهو 72.36 ديسيبل في جالان كيرامات وأدنى مستوى وهو 57.88 ديسيبل في جالان سيتياوانجسا 21. ولكن على أية حال، فقد أظهرت النتائج أن مستويات الضوضاء المسجلة في جميع الطرق المحددة تجاوزت الحدود المسموح بها. تأثرت كلتا النتيجتين بخصائص حدب الطريق ، وخاصة ارتفاع وعرض الحدب ، والتي أثرت على السرعة التي تنتجها السيارات، و هذا يدل على العلاقة الملحوظة بين سرعة حركة المرور والضوضاء وأكد على أن الزيادة في السرعة تؤدي إلى ولقد وجدنا أن العلاقة بين سرعة المرور ومستوى الضوضاء كانت مهمة لأن .ارتفاع مستوى الضوضاء مستوى الضوضاء قد تأثر بالسيارات المتسارعة والمتباطئة وحدبات وملامح الطُرق وكذلك أنواع السيارات.

أظهرت النتائج المتعلقة بالتغيرات المهمة أن حدب الطرق فعَّالة في تقليل السرعة، في حين أن نتيجة ضوضاء المرور كانت العكس. بالنسبة لنتائج الاستبيان ، فإن معظم السكان راضون عن عمل حدبات الطرق في تقليل سرعة حركة المرور مقارنةً بضوضاء المرور. كما أعرب السكان عن استيائهم من سرعة المرور والضوضاء ومع ذلك ، قيَّمت هذه الدراسة آثار حدب الطرق على سرعة حركة المرور .في مناطقهم السكنية ومستويات الضوضاء في المناطق السكنية من خلال مقارنة حدب الطريق وملامحه المختلفة. يمكن إجراء مزيد من الدراسات عن طريق اعتبار عوامل أخرى مثل حجم حركة المرور. يمكن أن تكون النتائج المتوقعة أساسًا في حل المشاكل المتعلقة بسرعة حركة المرور والضوضاء في المناطق السكنية بما في ذلك إجراء حدب الطرق في تطوير السكن الجديد.

APPROVAL PAGE

I certify that I have supervised and read this study and that in my opinion, it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a thesis for the degree of Master of Science (Built Environment).

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DECLARATION

I hereby declare that this thesis is the result of my own investigations, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

Siti Syazwani Ahmad Sofi

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This thesis is dedicated to;

My family;

Abah, Mak, Along, Angah,

.

.

And

You.

ACKNOWLEDGEMENTS

In the name of Allah, the Most Gracious and The Most Merciful.

Alhamdulillah, all praises to Allah for the strengths and His blessing in completing this thesis. I would first like to thank my supervisor, Assoc. Prof. Dr. Abdul Azeez Kadar Hamsa who granted me the gift of their unwavering belief in my ability to accomplish this goal: thank you for your support and patience. Not forgotten, my appreciation to my co-supervisor, Assoc. Prof. TPr. Dr. Mohd Zin for his support and knowledge regarding this topic.

I would also like to acknowledge Assoc. Prof. TPr. Dr. Syahriah Bachok and Assoc. Prof. Dr. Munzilah Md Rohani as internal and external examiners of this thesis, and I am gratefully indebted to them for very valuable comments on this thesis. My acknowledgement also goes to all office staffs of Postgraduate Office for their co-operations.

Sincere thanks and gratitude especially to my research colleague, Khairun Sarah Radhiah and friends for the kindness, help and advices during my study. Also, thanks to my superior and colleagues for being understanding throughout my study period. Just saying thank you will never repay your kindness.

Finally, I wish to express my appreciation and thanks to my parents and my siblings for providing me with unfailing support and continuous encouragement throughout my years of study and through the process of researching and writing this thesis. This accomplishment would not have been possible without them. To those indirectly contributed in this research, your kindness means a lot to me.

Thank you.

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CHAPTER ONE

INTRODUCTION

1.1 RESEARCH OVERVIEW

The societal development specifically in terms of living comfort and economic progress can be determined by the road traffic. Hamsa et.al. (2006) believed that the living environment in many residential areas has been deteriorating due to the increase in traffic volume, which resulted in generating noise pollution that affected the residents. Noise pollution has always been a major environmental cause for human (Sulaiman et. al, 2018). Besides, exposure to noise can cause health problems, disturbance and annoyance among the residents particularly those who live along or near the roadside. The loud noise from the speeding vehicles has interrupted the residents especially in the middle of the night.

In addressing to the above concerns, motorized vehicles need special treatment or control to have a safe and pleasant environment. The regulation on the speed limit does not seem to affect the drivers. Therefore, of all the traffic calming measures that have been established, road humps were introduced as a solution to reduce the speed of the vehicles as well as noise level (Schlabbach, 1997), which also agreed by (Roess et al, 2004; Huang and Cynecki, 2000).

However, as cited by Yaacob (2013), the drawbacks of the traffic calming measures according to Transport for London (TfL) is that it causes discomfort to two-wheeled vehicles, drivers and passengers of buses, increases journey time for bus and delay to the emergency vehicles as well as generates nuisance due to the noise and