ROAD SAFETY ASSESSMENT TOOL (RSAT) IN DETERMINING LEVEL OF SAFETY FOR ROAD DESIGN

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ABSTRACT

In Malaysia, there is an absence of standard guideline to determine the level of safety at design stage road project and inadequate numbers of certified auditors that are qualified as Road Safety Auditor. This research aims to design questionnaire related to safety measures of road design and to identify the best constant obtained from the multiply factors. This research attempts to determine the level of safety for road design project. The survey is conducted among the road user to get the respondent opinion about the road safety issue base on the element of road design. From the data survey, the data were analysed using statistical tool to obtain multiply factor and Road Safety Assessment Tool (RSAT) were then developed to check level of safety for road design project based on the constant resulted from analysis.The RSAT gave recommendation base on the Level of Safety where result score more then 80% will recommend that the design road project can be proceeded and below than 80% is recommended to design reviewdue to unsafe or potential hazard to road user. It is believed that the results of this study could provide a model for local agencies nationwide to implement road safety audit recommendations more effectively. It can be concluded that RSAT can be one of the tools to facilitate the review of road safety audit report. RSAT will help practitioners but this was the first step for quantifying RSAT recommendations.

ABSTRAK

Di Malaysia, tidak terdapat garis panduan bagi menentukan tahap keselamatan diperingkat rekabentuk projek jalanraya dan kekurangan juruaudit bertauliah yang berkelayakan sebagai Juruaudit Keselamatan Jalanraya. Kajian ini bertujuan untuk merekabentuk soal selidik yang berkaitan dengan langkah-langkah keselamatan di dalam rekabentuk jalanraya dan untuk mengenalpasti pemalar berdasarkan faktor berganda yang diperolehi.Kajian ini juga bertujuan menentukan tahap keselamatan bagi rekabentuk projek jalanraya. Kajian dijalankan di kalangan pengguna jalanraya untuk perolehi pandangan mengenai isu keselamatan jalanraya merujuk kepada elemen rekabentuk jalanraya. Melalui data kajian, ia dikumpul dan dianalisa menggunakan alat statistikal untuk mendapatkan faktor berganda dan alat penilaian keselamatan jalanraya (RSAT) dibangunkan untukmemeriksa tahap keselamatan bagi rekabentuk projek jalanraya berdasarkan pemalar hasil daripada analisa. RSAT memberikan cadangan berdasarkan Indeks Keselamatan skormelebihi daripada 80% disyorkan rekabentuk projek jalanraya tersebut boleh diteruskan dan skor kurang daripada 80% adalah disyorkan untuk kajian semula rekabentuk kerana ianya tidak selamat atau berpotensi merbahaya kepada pengguna jalanraya. Hasil kajian ini, ia boleh menyediakan satu model untuk agensi-agensi tempatan di seluruh negara untuk melaksanakan cadangan audit keselamatan jalanraya dengan lebih berkesan. Ia dapat disimpulkan bahawa RSAT boleh menjadi salah satu alat untuk memudahkan kajian laporan audit keselamatan jalanraya. RSAT ini akan membantu pengamal tetapi ini adalah langkah pertama untuk mengukur cadangan RSAT.

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LIST OF ABBREVIATIONS AND SYMBOLS

AASHTO	=	*American Association of State Highway and Transportation Officials*
ADB	=	*Asian Development Bank*
ATJ	=	*Arahan Teknik Jalan*
AusRAP	=	*Australia Road Safety Assessment Program*
DOT	=	*Department of Transportation*
EC	=	*European Commission*
EuroRAP	=	*European Road Safety Assessment Program*
FHWA	=	*Federal Highway Administration*
gTKP	=	*Global Transportation Knowledge Partnership*
Irap	=	*International Road Safety Assessment Program*
PWD	=	*Public Work Department*
RSA	=	*Road Safety Audit*
RSAT	=	*Road Safety Assessment Tool*
RSARs	=	*Road Safety Audit Review*
SAFETAP	=	*Safety Appurtenance Program*
SCDOT	=	*Spartanburg CountyDepartment of Transportation*
STIP	=	*State Transportation Improvement Plan*
U.K	=	*United Kingdom*
U.S	=	*United State*
UsRAP	=	*United State Road Safety Assessment Program*

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CHAPTER1

INTRODUCTION

1.1 Background of study

Road transportation is an important mode of transport in Malaysia that ensures both mobility of people and delivery of goods. Transportation in Malaysia has been dominated by road transportation ever since the introduction of road network at the end of the 19th century. In the last two decades, Malaysia has experienced a significant expansion in all portions of country's development including road transportation sector (Jawi *et al.*, 2009).The traffic accident and road safety issue is a most serious problem facing by our nation. The traffic accident problem in Malaysia is increasing year by year. The cost to the community is a huge price interm of pain and suffering of the people involved in traffic accident. Malaysia, is one of the development country has determined the road safety is a critical problem to be look into. The Public Work Department has implemented strategies which include type of road safety action. There are, Accident Reduction, which is focussed on identification and elimination of accident "Blackspots" and Accident prevention, focusing on designing safer roads and improved traffic management tools (PWD.1997).

In 1997, Public Work Department has implement Road Safety Audit (RSA). The RSA is a new road engineering technique to identify potential safety problem during planning, design and construction of new road project.Besides that, RSA is basically a formal examination of the characteristics and operations of an existing road in identify the potential safety hazards before the road become accident prone locations. It is typically conducted by qualified examiners which requires specialist skill based on a sound knowledge, experience and understanding of Traffic Engineering and Road Safety principle and practices. An important focus of RSA is its consideration of the specific safety needs of all road users.

The application of safety principles in RSA in new project design and improvements to the highway is to prevent crashes from occurring or to reduce their severity. The result of the audit is the identification of any potential safety issues, together with suggestions on how to address the issues. The RSA process requires an objective approach to the assessment of crash risk. The principal method of ensuring this objective is through the independent safety assessment of projects by persons not connected with the original design. Designers and planners need to be familiar with experience conducting road safety engineering technique.

The adoption of the RSA process, involving audits at various stages in the development of a project that will make a significant contribution toachieving safe and efficient road performance and also to ensure that road safety enhancements which is included in the project throughout the planning anddesign processes.

RSA will detect and eliminate unsafe features at the stage when changes to a design are most easily made, thus avoiding costly redesign or later reconstruction. Action at an early stage in the planning and design process also avoids 'locking in' conditions which leave designers with little flexibility to achieve effective solutions to problem areas. Alternatively, if desirable changes to a design cannot be made, early detection of potential safety deficiencies often allows other 'mitigating' works

to be included which can reduce the undesirable effects of design inadequacies (PWD. 1997).

1.2 Problem Statement

Road accidents constitute one of the major social problems in Malaysia. Accidents are relatively rare and unpredictable, sometimes it is direct observation and often impossible. In a developing country, the road accident has increased years by years. Road safety has long been considered one of the social responsibilities of the Malaysian Government. Through lots of observations and analysis of traffic accident conditions and effect of humans, vehicles and road environment in traffic system on traffic safety. It is found that the road safety level is one of the most important factors to the road traffic safety.

Road Safety Auditing is a 'specialised task' which requires specific knowledge and experience related to traffic engineering, traffic management and road safety principles and practice. A good understanding of traffic engineering, traffic management and the human factors involved in the driver/ vehicle/ road environment interaction is necessary, and preferably some experience in traffic accident site investigation and counter measures. Experience in the various aspects of planning, design, construction and maintenance of roads is also desirable. Usually people competent and experienced in the work associated with traffic accident investigations and counter measures have most of the basic skills required for RSA.

In Malaysia, there are inadequate numbers of certified auditors that are qualified as Road Safety Auditor. In Road Safety Audit, there are also requirements to introduce double checking measures for road designer to ensure the safety aspect has been taken care into the design before construction. Standard guidelines need to be carried out to determine the level of safety for road design project. So, this research is conducted to develop the road safety assessment tool in determining level of safety for the road design project.

1.3 Research Objectives

The aim of this study is to evaluatethe safety performance of road design project. To achieve the aim, this study will be based on the following objectives:

a. To design questionnaire related to safety measures of road design
b. To identify the constant obtained from multiply factors for the safety measure.
c. To develop a road safety assessment tool to measure the level of safety for road design project.

1.4 Scope of work

In order to make sure that this study is done along the right path and in assuring that the objectives that have been proposed are met, there are several limitations that need to be applied:

a. The scope of study mostly covered on the roadside development at T junction only.

b. This research focusedonanalysed multiply factor to get the best constant. It will carry out the raw data obtained from questionnaire and measurement using statistical approaches. The survey is conducted among the road user to get the respondent opinion about the road safety issue.

c. The validation process will focus on detailed design project stage (Stage 3 Audit).

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