

A SYSTEMATIC ANALYSIS OF EFFECTIVENESS OF ROAD ACCIDENT LEGISLATION AND ITS ENFORCEMENT POLICIES IN MALAYSIA

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Abstract

A road traffic accident is an unwanted incident that involved a motor-propelled vehicle that occurs on any publicly accessible road. Malaysia as one of the middle and low-income countries that represent 60% of vehicles and 85% of the total population around the world, accounted for more than 90% of all deaths caused by road traffic accidents. The objective of this article is to understand the reason that despite the government having enacted legislation and implemented enforcement policies, the accident rate in Malaysia continues to increase. The methodology of this article focused on literatures extracted from online sources namely SCOPUS, Google Scholar, and MyJurnal. The literatures extracted from the online sources were analyze with adherence to the PRISMA steps. As result, this article analyse the effectiveness of the government legislation and enforcement policies, highlight the gaps that exists that hamper its effectiveness curb road traffic accident and propose justifiable recommendations in terms of improving the legislation and enforcement policies in Malaysia.

Keywords: Road, Accident, Legislation, Enforcement, Effectiveness.

INTRODUCTION

The causes of road traffic accidents were volatile and researchers regardless of nationalities attempted to identify the cause with different angles and perspectives for decades. To ensure literature for this research can be collected and analysed in a systematic manner, "systematic analysis" needs to be adopted. The study by Higgins et al. (2011) defined SLR as a systematic literature review that seeks to effectively locate and examine related research via organised and transparent procedures at each step in the review process.

The first step in SLR is developing and validating the materials obtained. In this step, this research plans to review the materials by determining the effectiveness of government legislation and enforcement policies to curb road traffic accidents. There is a need to look into the meaning of road traffic accidents in the first place from layman and legal point of view.

In layman's terms, a road traffic accident is an unwanted incident that involved a motor-propelled vehicle that occurs on any publicly accessible road. Legally term, section 2 Road Transport Act 1987 (Act 333) defines road traffic accidents (RTA) as follows: -

—road means— (a) any public road and any other road to which the public has access and includes bridges, tunnels, lay-bys, ferry facilities, interchanges, roundabouts, traffic islands, road dividers, all traffic lanes, acceleration lanes, deceleration lanes, side-tables, median strips, overpasses, underpasses, approaches, entrance and exit ramps, toll plazas, service areas, and other structures and fixtures to fully effect its use; (b) for the purposes of sections 70 and 85, also includes a road under construction; and (c) for the purpose of sections 41, 42, 43, 44, 45 and 45A, also includes a parking place;

—traffic includes bicycles, electric bicycles, tricycles, motor vehicles, tram cars, vehicles of every description, pedestrians, processions, bodies of police or troops and all animals being ridden, driven or led;

—accident means an accident or occurrence whereby damage or injury caused to any person, property, vehicle, structure or animal;

Despite the government enacted various legislation coupled with multiple enforcement policies, the road traffic accident rate in Malaysia continue to increase. As such, this study aims to analyse the effectiveness of the government legislation and enforcement policies, highlight the gaps exist that hamper its effectiveness curb road traffic accident and propose justifiable recommendations in terms of improving the legislation and enforcement policies in Malaysia.

To achieve the purpose of this study, literatures were extracted from online sources namely SCOPUS, Google Scholar, and MyJurnal. There are several ways to conduct SLR in various research. “Preferred Reporting Items for Systematic Reviews and Meta-Analyses” (PRISMA) were chosen to ensure that the production of this study will be positioned in a systematic manner that able to obtain non-bias literature. Previously this method was only applied in healthcare studies. However, recently, PRISMA has also been employed in social science research and humanities including in the field of law and sharia. This research will also employ SLR particularly in determining the effectiveness of government legislation and enforcement policies to curb road traffic accidents.

METHODOLOGY

In this study, databases from online sources such as SCOPUS, Google Scholar, and MyJurnal were selected to obtain literature related to the scope of this study. The database from the three sources is extracted and analyzed through adherence to the PRISMA steps. (Margaret J. et al., 2017). The PRISMA steps consist of “Plan Identify Evaluate Collect Explain Summarize” (P.I.E.C.E.S) had been performed in sequence as follows: -

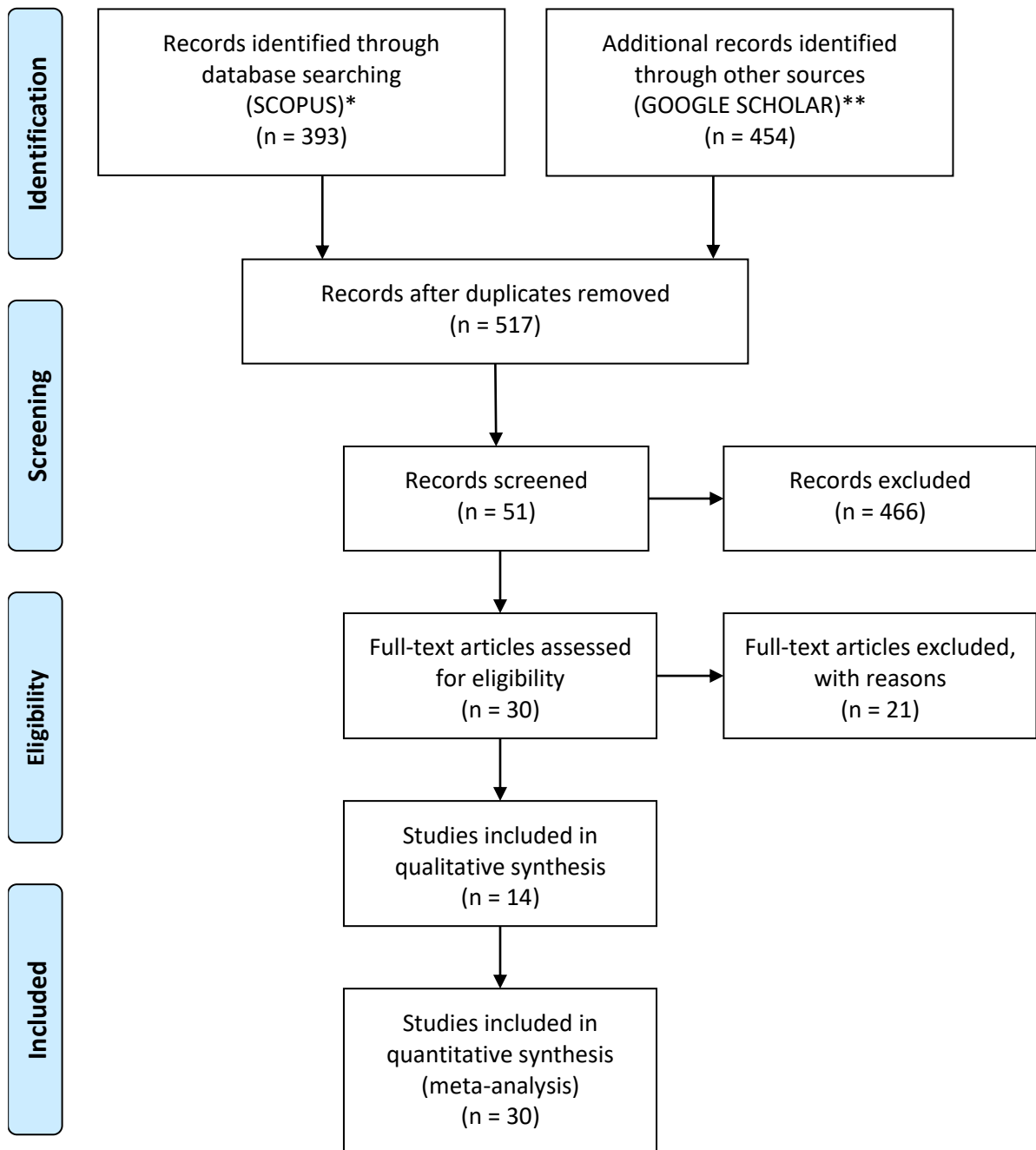
Table 1: PRISMA Steps

P: Plan	<ul style="list-style-type: none"> • Decide on the methods of the systematic review before conducting it. • Identify search terms, including keywords, synonyms, and subject headings to search selected databases. • Perform scoping searches in selected databases (to find background literature that may help you refine your research question and set inclusion/exclusion criteria). • Set inclusion/exclusion criteria (such as specific aspects of a population; outcomes, and study designs; and limiters such as publication date range and language).
I: Identify	<ul style="list-style-type: none"> • Systematically search for studies using predetermined criteria. • Finalize selection of databases to search. • Design a search strategy using subject headings, keywords, Boolean operators, and/or proximity operators for each database.

	<ul style="list-style-type: none"> • Export results from each database into a citation management program such as Mendeley or EndNote. • Remove duplicate citations using the citation management program, save remaining citations as an RIS file, then import the RIS file to your reference management software. • Document the process using PRISMA flow diagram.
E: Evaluate	<ul style="list-style-type: none"> • Sort all retrieved articles into included or excluded categories; then assess the risk of bias for each included study. • First screening (use exclusion criteria to exclude studies. • Second screening (use inclusion criteria to include studies. • Assess quality of included studies.
C: Collect/ Combine	<ul style="list-style-type: none"> • Create a coding form to capture study characteristics; then synthesize data qualitatively or quantitatively. • Use software to create a coding form.
E: Explain	<ul style="list-style-type: none"> • Contextualize synthesis results, noting strengths and weaknesses of the studies.
S: Summarize	<ul style="list-style-type: none"> • Report or describe methods and results in a clear and transparent manner. • Use the PRISMA Checklist to report methods.

In the PRISMA steps of Identify, as the database obtained from MyJurnal is comparatively lesser compared to the SCOPUS and Google Scholar, the result database obtained from the SCOPUS and Google Scholar were documented using PRISMA flow diagram (Moher D. et al., 2009). The PRISMA flow diagram consists of four (4) phases namely identification, screening, eligibility and included. Table 2 below demonstrates the PRISMA flow diagram used to document the database obtain from SCOPUS and Google Scholar.

Table 2: PRISMA Flow Diagram



In the PRISMA steps of Identify, the five (5) keywords used for this research in search of the online database were Road Traffic Accident, Traffic Legislation, Traffic Enforcement, Traffic Policies, and Effectiveness. In addition, the search strategy by five keywords was further enhanced by the practice of Boolean operators. The Boolean operators were used by combining words and phrases using the words AND, OR, NOT in order to limit and define searches for literature. Figure 1 below demonstrates the symbol and coding in a search or query string developed in Scopus.

Figure 1: Symbol and coding in a search/query string developed in Scopus.

"" TITLE-ABS-KEY ROAD TRAFFIC ACCIDENT OR TRAFFIC LEGISLATION OR TRAFFIC ENFORCEMENT OR TRAFFIC POLICIES AND EFFECTIVENESS AND (LIMIT-TO (EXACTSRCTITLE,"Accident Analysis And Prevention") OR LIMIT-TO (EXACTSRCTITLE,"Transportation Research Record") OR LIMIT-TO (EXACTSRCTITLE,"Transportation Research Part A Policy And Practice") OR LIMIT-TO (EXACTSRCTITLE,"Traffic Injury Prevention") OR LIMIT-TO (EXACTSRCTITLE,"Transportation Research Part F Traffic Psychology And Behaviour") OR LIMIT-TO (EXACTSRCTITLE,"Transportation Research Part C Emerging Technologies") OR LIMIT-TO (EXACTSRCTITLE,"Transportation Research Part D Transport And Environment") OR LIMIT-TO (EXACTSRCTITLE,"Transport Policy") OR LIMIT-TO (EXACTSRCTITLE,"Journal Of Safety Research")) AND (LIMIT-TO (AFFILCOUNTRY,"United Kingdom") OR LIMIT-TO (AFFILCOUNTRY,"Australia") OR LIMIT-TO (AFFILCOUNTRY,"Canada")) AND (LIMIT-TO (LANGUAGE,"English"))""

RESULTS

This research had employed the method of SLR by compiling and analysing the literature through the content analysis method by adapting deductive and inductive reasoning. The data analysed will be deductively displayed in form of matrix tables (Microsoft Excel format). All literature in form of publication was then sorted into different categories according to the variables such as field of study and publication year. Consider this study were conducted during the course of University master research program, the range of years involved in this research is limited to the recent period of ten years from 2010 until 2020. In a comparison of all 862 recent works of literature gathered from three online databases (SCOPUS, Google Scholar, and MyJournal), differences were recorded and analysed to get the scopes and trends of the studies. Table 3 below demonstrate the number of publication by sources. Table 3 concludes the highest number of publications obtained from the source of Google Scholar (52.7%) while the least from the source of MyJournal (1.7%).

Table 3: Number of Publication by Sources

Bil	Research Areas	Number of Publications	Percentage (%)
1	SCOPUS	393	45.6
2	GOOGLE SCHOLAR	454	52.7
3	MYJURNAL	15	1.7
TOTAL		862	100

Table 4 below further demonstrate the number of publication by sources and by years from 2010 until 2020.

Table 4: Number of Publication by Sources & By Years

No	Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
	Sources	Number of Publication											
1	SCOPUS	14	21	19	32	24	44	37	44	48	60	50	393
2	GOOGLE SCHOLAR	10	16	20	18	41	51	41	37	52	71	97	454
3	MYJURNAL	0	0	1	0	0	1	3	2	4	3	1	15
TOTAL		24	37	40	50	65	96	81	83	104	134	148	862

Table 5 below demonstrate that highest number of 148 publications in year 2020 (17.16%) while the least number of 24 publications in year 2010 (2.79%).

Table 5: Number of Publication by Years

Year of Publication	Number of Publications	Percentage (%)
2010	24	2.79
2011	37	4.29
2012	40	4.64
2013	50	5.8
2014	65	7.54
2015	96	11.13
2016	81	9.39
2017	83	9.62
2018	104	12.1
2019	134	15.54
2020	148	17.16
TOTAL	862	100

To fit the scope of research, the publication categorized according to three research areas namely road traffic accidents, legislation governing road traffic, and enforcement policies. Table 6 demonstrates the number of publications in three categories of research areas. Table 6 concludes the highest number of publications in the road traffic accident area (36.7%) while the least in the enforcement policies area (27.5%).

Table 6: Number of Publication by Research Area

Research Areas	Number of Publication	Percentage (%)
Road Traffic Accident	316	36.7
Legislation Governing Road Traffic	309	35.8
Enforcement Policies	237	27.5
TOTAL	862	100

Table 7 below demonstrate the number of publication by research area in period of years 2010 until 2020.

Table 7: Number of Publication by Research Area

No	Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
		Number of Article											
1	Road Traffic Accident	11	15	16	19	17	33	27	31	42	53	55	319
2	Legislation Governing Road Traffic	8	19	14	21	26	29	25	30	28	39	67	306
3	Enforcement Policies	5	3	10	10	22	34	29	22	34	42	26	237
TOTAL		24	37	40	50	65	96	81	83	104	134	148	862

DISCUSSIONS

There were several significant pieces of literature in form of published papers produced by contemporary scholars discussed the issue of road traffic accidents, legislation enacted and policies enforced to curb road traffic accidents. The result of quantitative analysis had identified a total of 30 works of literature that is eligible for the discussion of this research. Table 8 below is listed among the recent 30 full-text works of literature assessed for its eligibility application toward three areas of this research topic.

Table 8: List of Literatures in Areas Related to Research Topic

Research Areas	Literatures
Road Traffic Accident	Road Traffic Accident Injury (Shanthi Ameratunga, Martha Hijar, Robyn Norton, 2006), Profiling Traffic Offenders (Watson B., Watson A., Siskind V., Fleiter J., Soole D, 2015), Media Support (Brubacher, J.R., Desapriya, E., Chan, H., Ranatunga, Y., Harjee, R., Erdelyi, S., Asbridge, M., Pursell, R., Pike, I., 2006), Legal And Non-Legal Sanctions (Freeman, J., Szogi, E., Truelove, V., Vingilis, E., 2006), Economic Activity (Nghiem, S., Commandeur, J.J.F., Connelly, L.B., 2006), Driver Behaviour (Mohamad Ghazali Masuri, Khairil Anuar Md Isa, Mohd Pozi Mohd Tahir, 2012), Lifestyle (Dragana Stanojević, Predrag Stanojević, Dragan Jovanović & Krsto Lipovac, 2018), Attitude (Redhwan AA, Karim AJ, 2010), Socio-economic (Grimm, M, & Treibich, C., 2010), Road Environment (Darma, Y., Karim, M.R. & Abdullah, S, 2017), Global Road Safety (McIlroy, R.C., Plant, K.A., Hoque, M.S., Jianping, W., Kokwaro, G.O., Vü, N.H., Stanton, N.A., 2019).
Legislation Governing Road Traffic	Usage of Safety Items (Zulhaidi Mohd Jawi, Mohd Hafzi Md Isa, Norlen Mohamed, Azmi Awang and Mohd Rasid Osman, 2015), Street Racing and Stunt Driving Law (Meirambayeva A., Vingilis E., Zou G., Elzohairy Y., McLeod A.I., Xiao J, 2014), Road Lighting (Nabavi Niaki M.S., Saunier N., Miranda-Moreno L.F., Amador L., Bruneau J.-F, 2014), Road Safety Program (Ian Glendon A., McNally B., Jarvis A., Chalmers S.L., Salisbury R.L., 2014), Drug-Impaired Driving Law (Solomon R., Chamberlain E., 2014), Blood Alcohol Concentration Limit On Law (Blais É., Bellavance F., Marcil A., Carnis L., 2015), Footbridge users (Hasan R., Oviedo-Trespalacios O., Napiah M., 2020), Pedestrians at crossing (Anciaes P., Di Guardo G., Jones P., 2020), Child Restraint Legislation (Shanthosh J., Rogers K., Lung T., Brown J., Ivers R., Wilson A., Jan S., 2020), Increased Penalties (Wickens C.M., Ialomiteanu A.R., Cook S., Hamilton H., Haya M., Ma T., Mann R.E., Manson H., McDonald A., 2020), Bicycle Lane (Park, J., Abdel-Aty, M., Lee, J., Lee, C, 2015).
Enforcement Policies	Perceptions of Police Enforcement Strategies (Khaled Shaaban, 2017), Initiative to Increase Use of Seat Belts (Wilson R.J., Wiggins S., Fang M, 2010), Red Light Cameras (Tay R., De Barros A, 2011) & (Li, H., Graham, D.J., 2006), Token economy (Mullen, N.W., Maxwell, H., Bédard, M., 2015)(Ellison, A.B., Bliemer, M.C.J., Greaves, S.P., 2015), Vehicle Impoundment (Byrne, P.A., Ma, T., Elzohairy, Y., 2006), Demerit Point System (José Pulido, Pablo Lardelli, Luis de la Fuente, Víctor M Flores, Fernando Vallejo, Enrique Regidor, 2000)

Throughout the research, full-text articles had been carefully reviewed by using qualitative analysis for eligibility towards the scope of this research. Between recent years of 2010 until 2020, there was a significant amount of literature from Commonwealth nations discovered which related to the discussion about the effectiveness of legislation and enforcement policies to curb road traffic accidents. Considering the limitation of available Malaysia literature in this field of study, plus Malaysia is a Commonwealth nation that adopted similar road traffic rules with other Commonwealth nations around the world, the

literature available from the Commonwealth nations have been study in order to assess the effectiveness and enforcement policies in Malaysia.

Road Traffic Accident

Various studies had discussed the issue of a road traffic accident and its consequences. In a study conducted by Shanthi Ameratunga et al. (2006), injuries caused by road traffic accidents ranked as the 11th leading factor of fatality in the world since 2002 and expected to rank as a 3rd leading factor of fatality by 2020 if no appropriate or drastic measures taken immediately. In terms of fatality rate, road traffic accidents caused an average of over one million deaths per year with countless injuries and property damage around the world. Malaysia as one of the middle and low-income countries that represent 60% of vehicles and 85% of the total population around the world, accounted for more than 90% of all deaths caused by road traffic accidents (United Nations General Assembly, 2019). In a study conducted by Darma, Y., Karim, M.R. & Abdullah, S (2017), various initiatives and programs have been taken by the Malaysia government to resolve factors pertaining to the occurrence of road traffic deaths. Nevertheless, the number of road traffic deaths in Malaysia continue to rise, with the highest number of fatality for straight road segments and lack of street lighting provision. From a global perspective, through the comparison of the road safety system of different nations in terms of interconnecting organisations, the organisation's influences on road safety, and the differences between nations, the study concluded that there is a need to assess beyond the road user's perspective when designing a road safety intervention (McIlroy, R.C., Plant, K.A. et al., 2019).

Continuance rising of road traffic accidents can be attributed to various factors, ranging from road user personality, perception of society by media, socio-economic and legal sanctions in place. In terms of road user personality, the study of three common ergonomics principles of human-machine-environment by Mohamad Ghazali Masuri et al. (2012) found that young people aged 30 years old below representing the highest number of victims involved in road traffic accident cases thus necessitated further research to improve young driver's behaviour and responses in driving activities. Further study by Dragana Stanojević et al. (2018) concluded that the lifestyle of the motorcyclists can contribute towards the risky behaviour and possibility of being involved in traffic accidents. A study in Malaysia by Redhwan AA et al. (2010) showed that the road user personality can affect by the knowledge and lack of awareness about road traffic thus constituted an important cause of road traffic accidents, the university students that participated in this study strongly convinced attitude and age were two main factors significantly associated with the exposure to the road traffic accident.

In terms of perception of society by media, a study by Brubacher, J.R. et al. (2006) found that media attention generated both pros and cons toward the occurrence of road traffic accidents, media attention proven able to effectively inform the public of the road traffic law thus enhanced its deterrent effect. In terms of socio-economic, study by Grimm. et al. (2010) concluded that the economies of underdeveloped and developing countries can be determinants of road traffic accident fatalities. Further study by Nghiem. et al. (2006) concluded that reductions in economic activity are associated with reductions in road fatalities, this study estimated that a 0.2% reduction in traffic fatalities is associated with a 1% increase in the unemployment rate.

Finally, in terms of legal sanctions towards the road traffic accident, the study had highlighted the road traffic accident will continue to increase unless there are reforms of traffic law traffic violation classification and penalties plus tougher law enforcement which deliver an impactful consequence to the rogue speeding road users (Watson B. et al., 2015). A study by Freeman, J. et al. (2006) highlighted that quantitative analysis of the data found that the perceptions by participants towards both legal sanctions (e.g., severity, certainty, and swiftness) and non-legal sanctions (e.g., physical harm or fear of social perception) were relatively high.

1. Legislation Governing Road Traffic

There were various legislations enacted by the government to govern the road traffic aimed to curb road traffic accidents. However, as road traffic accidents continued to increase at an alarming pace, rely on the legislation can be only considered as “basic” since the practice of enforcement will face multiple challenges such as limited resources (Zulhaidi Mohd Jawi et al., 2015). To govern the road traffic, the legislation seeks to regulate various issues ranging from the definition of offenses and penalties, road user behaviours to the road facilities construction.

In term of defining offenses and penalties, a study by Meirambayeva A. et al. (2014) established that legislation define traffic offense in particular street racing and stunt driving which carried certain swift, and severe penalties can have an impact on deterring risky driving behaviour. A similar finding can be found in the study by Wickens C.M. et al. (2020) whereby decrease in the offense of Texting While Driving (TWD) following the introduction of harsher penalties in legislation plus corresponding education program and enforcement efforts.

However, contradictory findings of the effectiveness of legislation can also be found. The study by Solomon R. et al. (2014), concluded that the amendment of legislation for drug-impaired driving offenses resulted in court prosecution charge rates remaining extremely low with minimal deterrent effects. In fact, the introduction of administrative blood alcohol concentration (BAC) laws did not create any significant changes in reducing road traffic accidents involving driving under the influence of alcohol (Blais É. Et al., 2015). Furthermore, the introduction of child restraint legislation did not produce a statistically significant effect but instead increase the rate of serious injuries and fatalities during the post-legislation period as compared to the period prior to such legislation (Shanthosh J. et al., 2020).

Cited in the study of Ian Glendon A. et al. (2014), this study measures the attitudes of a sample of high school students towards unsafe driving behaviours and risk perception following their participation in the road safety program, prior to the program and immediately after the program. The study shows that in terms of road user behaviours, any existing legislation that encourages a higher participation rate of road safety evaluation program by road users can lead to a better understanding of the road safety intervention programs thus ensure lower engagement in unsafe driving behaviours by young drivers.

In terms of road facilities construction, study of statistical analysis demonstrated that substandard road lighting or illuminance that does not fit with the legal specification required by the government correlated with the number of road traffic accidents happened during night time (Nabavi Niaki M.S. et al., 2014). A study by Park, J. et al. (2015) showed that adding bike lane on urban road enhance the positive safety effects for all type of road traffic crashes especially those involved bike. The study by Anciaes P. et al. (2020) shows that legislation that regulates multiple design elements such as textured road surfaces, ramps at pedestrian crossways and narrowing of the carriageway can encourage the vehicle drivers to stop at pedestrian crossing thus decrease the road traffic accident involving a pedestrian. The study by Hasan R. et al. (2020) showed that the design of the pedestrian footbridge and lack of alert measures to vehicle users of the pedestrian was highly associated with the reason of road traffic accidents involving pedestrians thus necessitating the enactment of legislation to construct pedestrian footbridge in a user-friendly manner.

2. Enforcement Policies

Road traffic accidents is a major cause of fatality in many countries, studies previously conducted have shown that road policing policy, traffic enforcement strategy, and associated fines or penalties are crucial in ensure successful road safety strategy to curb road traffic accidents. In the study by Khaled Shaaban (2017), the automated enforcement cameras, heavy traffic offenses penalty and the automation of the demerit point system were perceived to be the most successful three existing road traffic enforcement strategies

existed, nonetheless, it was concluded that there is no standard type of enforcement strategies that can be suitable regardless of all situations, environments and cultures.

The study by Wilson R.J. et al. (2010) found that the percentage of vehicle occupants without wearing seat belt involved in road traffic accidents reduced in areas where there is an increase of seat belt ticketing by police. A similar finding in the study by José Pulido. et al (2000) whereby the implementation of the Demerit Point System (DPS) by the traffic police has led to reduction in the number of traffic accident deaths in the context of a downward trend significantly. On-road research suggests that the enforcement policy of driver feedback combined with a token economy (a system of delayed reinforcement whereby tokens or points are distributed following the desired behaviour and are later exchanged for desired items) can reduce speeding thus reducing road traffic accidents (Mullen et al., 2015). Similarly, in a study by Ellison. et al. (2015) whereby enforcement policies of award drivers with financial incentive to change behaviour can greatly reduce their risk of getting involved in a road traffic accident. A study by Byrne, P.A., Ma, T., Elzohairy, Y. (2006) demonstrates that enforcement policy of vehicle impoundment or its threat tends to improve compliance of traffic law by road users.

However, some findings established that there were limitations found in the enforcement policies to curb road traffic accidents. In a study by Tay R., De Barros A (2011), the results suggest that install speed cameras at a fixed position that keep the enforcement predictable to road users will yields a lower average violation rate than install speed cameras around different positions that keep the enforcement uncertain. A study by Li, H., Graham, D.J. (2006) also showed that the effects of speed cameras varied across camera sites and such effects are dependent on each site characteristic.

CONCLUSION

The rapid industrialization in terms of motorisation had indeed enhanced the lives of all individuals throughout the world, albeit such benefits come with a price of increasing road traffic accidents. While the numbers of fatalities and injuries inflicted by road traffic accidents in developed countries indicate a positive downward trend in recent decades, the burden of road traffic fatality and injury in terms of societal and economic cost for most of the world's population in particular Malaysia remain rising. Considering there is a lack of detailed studies in this field concerning the legislation and enforcement policies to curb road traffic accidents in Malaysia, this study was carried out to fill the gaps by providing an academic and practical contribution in this field of study. Therefore, this article intends to analyse the effectiveness of the government legislation and enforcement policies, highlight the gaps that exists that hamper its effectiveness curb road traffic accident and propose justifiable recommendations in terms of improving the legislation and enforcement policies in Malaysia.

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