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Research article

Assessment of road safety management at institutional level in Malaysia: A case study[☆]

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ABSTRACT

This paper examines the current institutional arrangements for the management of road safety in Malaysia in a systematic manner. It focuses on road safety funding and seeks to provide an insight into how funding factors may affect both the effectiveness and the efficiency of road safety management. The study follows an exploratory approach based on semi-structured interviews targeting key stakeholders in road safety management such as policy makers from various government agencies, private sector representatives and academia. The information collected is subsequently analysed using a template analysis technique based on a set of criteria defined by the World Bank. The analysis reveals that the efficiency and effectiveness of the road safety management system in Malaysia may be sustainably improved by addressing the current dependence of funding solely on government sources, the fragmentation of the decision making process of this de facto multi-disciplinary area, the road safety legislative framework, public awareness, local needs and institutional capacity. An institutional model based on 2nd generation road funds is tentatively suggested to this effect.

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1. Background

Road safety is a collective responsibility that requires the involvement of government, civil society as well as businesses from both the public and private sector. It requires a well-planned strategy and an associated plan. However, despite the impact of poor road safety on societies and economies around the world resulting in an annual loss of Gross Domestic Product (GDP) in the order of 2%–5%, only a limited number of countries follow coordinated approaches to road safety management. Unfortunately, the countries that suffer the most are those in need of development. For example, according to the Road Safety Report by the World Health Organisation [1], Malaysia recorded 25 deaths per 100,000 population which is among the world's highest figure,

compared to a regional figure of 17.9 deaths per 100,000 population. This has caused negative social and economic effects and an estimated economic loss of about MYR 79 billion since 2004 [2]. Moreover, the institutional road safety management worldwide and primarily in LMICs has been weak, leading to failure to reduce road traffic accidents in these countries [3]. In particular, there are issues associated with (a) the identification of appropriate institutional management functions and (b) interventions and achievement of results. There is a need therefore to investigate how road safety is affected at institutional level and this study seeks to provide such a systematic approach using Malaysia as a case study.

It has been stated that there is a correlation between the amount of investment in road safety and its positive impact [4] and that many countries have failed to ensure that road safety plans are delivered successfully since they have been forced to cut down their road safety actions because of lack of funding and weak commitment from the stakeholders [5,6]. These findings further supported by a study by Batool et al. [7] who found that in LMICs, governments tend to value road safety low, and, as a result, the budget for road safety is compromised whenever the government reduce their yearly spending. For example, in Malaysia the budget for road safety campaigns allocated to the in 2015 was only MYR 2 million compared to MYR 8 million received in 2014. This is about a 75% decrease and it is being considered as worrying. This is in agreement with Zietlow [8,9] who stated that insufficient and unsustainable funding conditions are the most important and necessary issues that need to be addressed to improve road safety. To this

Abbreviations: BRIC, Brazil, Russia, India and China; GDP, Gross Domestic Product; LMIC, low and middle income country; MYR, Malaysian Currency, Ringgit; MIROS, Malaysian Institute of Road Safety Research; MOT, Ministry of Transport; MOF, Ministry of Finance; PEMANDU, Performance Management & Delivery Unit, Prime Minister's Office; RMP, Royal Malaysian Police; RSC, Road Safety Council; RSD, Road Safety Department; RTD, Road Transport Department; WHO, World Health Organisation.

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end, this study focused on the funding issues of road safety and in connection with the success (or failure) of conventional funding mechanisms.

Furthermore, the strengthening of institutional road safety management and the appointment of one lead government agency to guide the national road safety actions are two other important measures recommended by the World Health Organisation (WHO) [10]. Their implementation ensures the effectiveness of road safety management, a well-planned road safety strategy and associated plan. In addition, three important related elements should be considered: (a) the institutional management functions, (b) the interventions needed, and (c) the consequent results. In addition, it has been postulated by Bliss & Breen [3] that it is crucial to understand that effective institutional management is of primary importance for successful result-focused interventions. Furthermore, the effectiveness of road safety management at institutional level should be considered in terms of results achieved from the implementation of actions associated with legislation, coordination, promotion, monitoring and evaluation, and research and development through knowledge sharing (see Fig. 1).

This figure was introduced by the World Bank as a guideline to create good practice in road safety management and subsequently considered in a number of countries such as Sweden, Western Australia, Brazil, Russia, India and China (BRIC) [11,12,13]. Albeit very helpful, the approach cannot be considered as a model of a process that can improve road safety. In addition, it does not show the role of funding in achieving the results sought. This paper therefore presents a systematic analysis for the assessment of road safety management applicable in countries where financial resources are limited or reduced, focusing on road safety funding and seeking to provide an insight into how appropriately designed funding mechanisms may affect both the effectiveness and the efficiency of road safety management using Malaysia as a case study. Effectiveness concerns the manner in which road safety strategic targets are defined, agreed and met and efficiency is linked to the optimisation of the resources utilised to achieve these targets.

2. An overview of Malaysian road safety policies

Malaysia was chosen as a country suitable for this research as it is widely viewed as an established dynamic and progressive middle income country of Southeast Asia experiencing rapid growth in economic, motorization and industrialization [14]. The rapidly increasing number of vehicles lead to a higher risk exposure to road accidents despite the upgrading of the infrastructure, the construction of new roads and

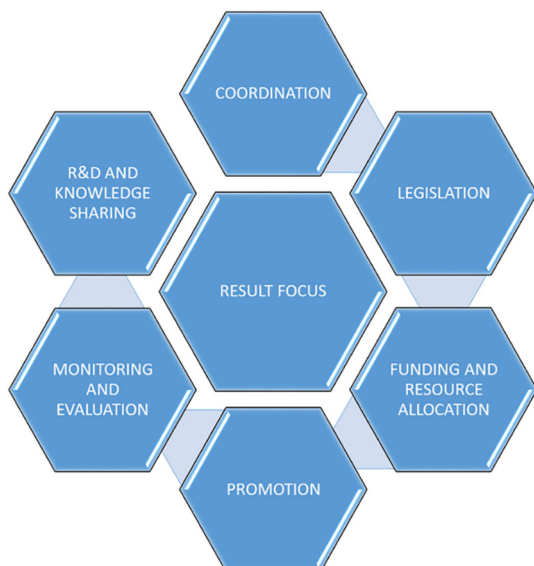


Fig. 1. Institutional management functions (Bliss and Breen [3]).

highways [15,16] and the proactive actions taken to create better road safety conditions and results. In Malaysia, a Cabinet Committee on Road Safety chaired by the Prime Minister was formed at the highest level to review, monitor and ensure the reduction of road traffic injuries and fatalities in Malaysia. For the first time, a target to reduce road fatalities by 30% by the year 2000 was set-up by the Committee. At the same time, the national road safety plan was formed in 1991 addressing road safety management, research, road and vehicle engineering and emergency response [17]. The government implemented the first Road Safety Plan of Malaysia (RSPM) in 2006 through the newly established Road Safety Department (RSD) which later became the lead organisation for road safety. The plan set out the government approach to implement road safety initiatives concerning the four E's of road safety: engineering, education, enforcement and emergency response [18]. At the end of the implementation plan in 2010, the results achieved were examined as shown in Table 2. The evidence showed that the targets specified in the RSPM 2006–2010 were not fully achieved but there were some improvements in road safety during 2006–2010. It was also found that one of the main reasons why these targets were not achieved was the delay in the implementation of some of the outlined initiatives due to funding issues [2].

In 2015, the Ministry of Transport (MOT) launched a new Road Safety Plan for 2014–2020 which was based on the Decade of Action by the United Nations [2] and designed specifically with the need for adequate resources in mind. In parallel, a fatalities prediction model based on an autoregressive integrated moving average (ARIMA) model was developed by the Malaysian Institute of Road Safety Research (MIROS) to predict the number of fatalities in Malaysia until the year 2020 [19] and to support the performance of the launched plan against a target to reduce road accident fatalities by 50% as shown in Table 3.

However, it appeared that the above actions did not consider the fundamental factors of funding and institutional structures associated with the success of road safety strategic plans as outlined in Section 1. Consequently it was felt necessary to provide an insightful analysis into this with the view to suggest an enhanced model for road safety management.

3. Methodology

To achieve the above objectives a qualitative approach using a focus group of Malaysian officials was used. This was as follows.

3.1. Interviewees

Both interviews and systematic examination of official reports by the government were used in this research in order to gather information for further qualitative analysis. Interviews were undertaken between November and December 2014 with the members of a focus group of 14 key stakeholders responsible for, and involved in, decision making processes and policy formulation for road safety. The interviewees were from the government sector, the private sector and the academia. The selection of the interviewees that participated in the research was based on their involvement in road safety management at institutional level in Malaysia as shown in Table 1.

3.2. Interview methodology

The interviews were planned in order to gather information with regard to road safety management and its financing. Prior to the interviews, each interviewee was given a list of 28 open-ended questions and guidelines through email. These questions were designed to assess the effectiveness and efficiency of the Road Safety Management in Malaysia with regard to achieving appropriate results (in connection with the Road Safety Plan for 2014–2020), ensuring coordination among the government organisation involved in road safety, the sufficiency of the legislation, the efficiency of the funding mechanisms, the

Table 1
List of Interviewees.

Code	Designation	Ministry/department	Experience
R1	Secretary General	Ministry of Health	33 years
R2	Director General	Malaysian Institute of Road Safety Research	22 years
R3	Director General	Malaysia Highway Authority	32 years
R4	Director	Royal Malaysian Police	30 years
R5	Director	Policy, Road Safety Department	15 years
R6	Director	Enforcement, Road Transport Department	31 years
R7	Director	Highway Planning Unit, Ministry of Works	29 years
R8	Under Secretary	Policy, Ministry of Transport	32 years
R9	Under Secretary	Finance, Ministry of Transport	15 years
R10	Deputy Director	Budget Office, Ministry of Finance	15 years
R11	Deputy Director	Land Division, Ministry of Transport	15 years
R12	Director	Road Safety Research Centre, UPM	28 years
R13	General Manager	PROLINTAS, Highway Concessionaire	26 years
R14	Treasurer General	Automobile Association of Malaysia	35 years

implementation of promotion and other activities, the monitoring and evaluation of the entire road safety programme and the success of the research and development initiatives as suggested by the World Bank (see Fig. 1). Since the interviews were conducted face-to-face, they offered the opportunity to acquire further clarifications or explanations about certain questions or answers given by the interviewees [20]. The data collected were analysed to identify the issues that impede road safety management and the findings are presented in the following sections.

3.3. Analysis

The data gathered were analysed using a type of qualitative data analysis known as template analysis technique which has been extensively used in qualitative research [21,22]. This method of analysis produces a list of codes signifying themes which characterise the textual data. The coding list helps in formulating a conditional template which is then used to mark up the rest of the transcripts. The codes may be considered at 3 different levels; Level 1, which is the highest level and is identified as macro level, comprises the set of the seven criteria as a-priori themes (c.f. in Fig. 1). Level 2 includes the key components of the above criteria. Level 3 provides more details about the components of Level 2. The codes that are related or linked with each other were then grouped together and organized hierarchically according to each level. The output produced from the template analysis which shows the list of codes, their level and the manner in which the codes are linked, is given in Fig. 2.

4. Findings

4.1. Results focus

Yes in term of index it's declining. Ironically, statistics of fatalities jump up...and then I believe it's quite far from our target!!
[[Official]]

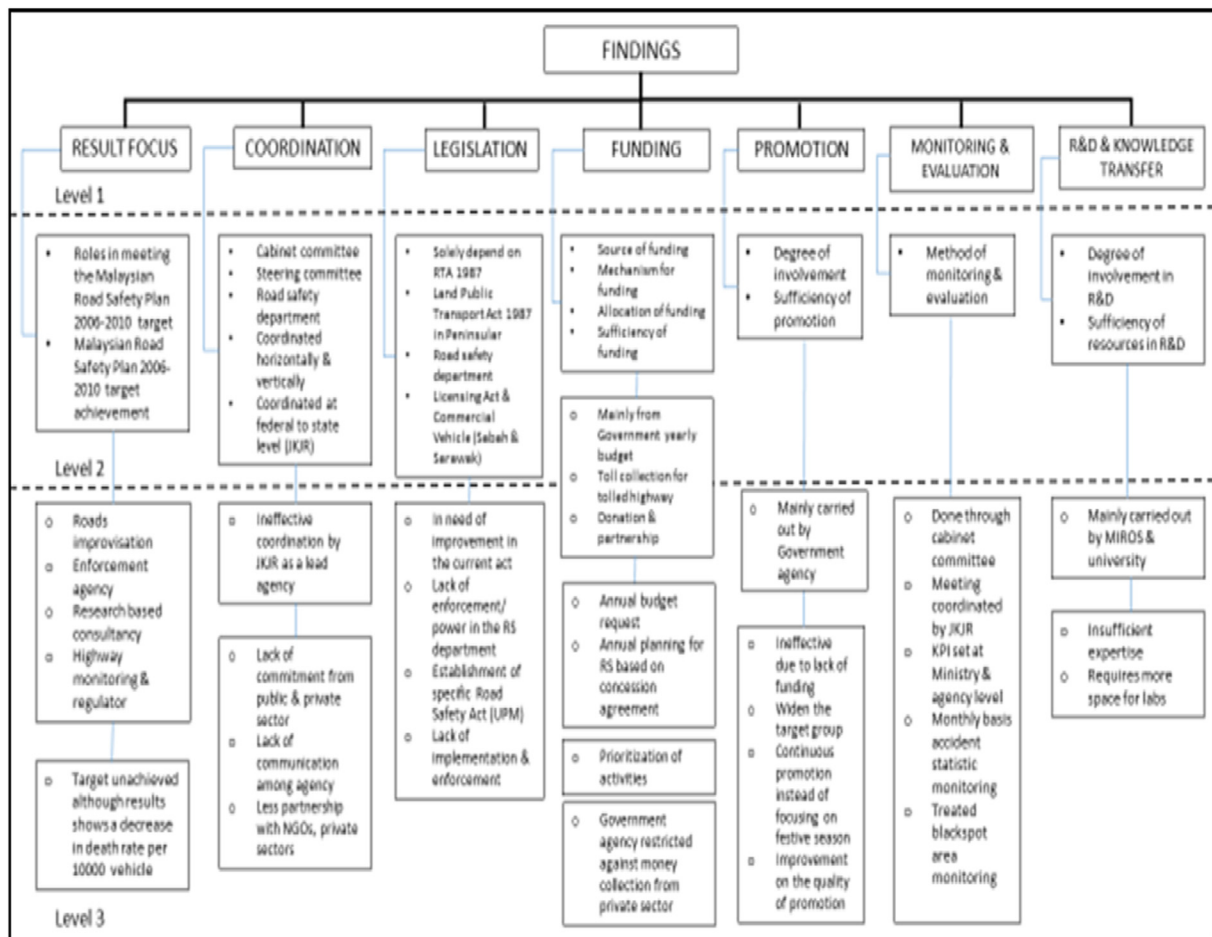


Fig. 2. Findings emerged from template analysis technique.

All the stakeholders agreed, that the first road safety plan 2006–2010 did not achieve its road safety target, as stated in Table 2. However, the Road Safety Department (RSD) played a vital role as the lead government agency in road safety in the formulation of road safety plans. Yet, it was clarified that significant partnership was needed among the government ministries to establish a broad and long term road safety vision.

So in terms of setting up target, the planning has been distributed to all organization, even to our Cabinet Committee. Our next step is to establish a working committee for Road Safety Plan 2014–2020.

[(Official)]

RSD were in the process of establishing a steering committee for each strategy set under the overall plan. Consequently it was agreed that the key stakeholders would support the overall plan, its strategies and the related programmes. Each stakeholder would have its own allocation of funding for the implementation of activities. Although RSD acts as the main coordinator for the RSPM 2014–2020, each stakeholder will hold the responsibility towards their road safety programmes and regular meetings will be held among them to discuss the effectiveness of each program.

As road safety is one of the national priorities, each stakeholder including the Ministry of Transport (MOT) is assessed with regards to agreed Key Performance Indicators (KPIs). The assessment for these KPIs is done on a yearly basis by the Performance Management and Delivery Unit (PEMANDU), under the Prime Minister's (PM) Department which reports directly to the PM.

The above structure seems to be satisfactory but it seems that it can be significantly influenced by politicians. In addition, its success depends on the availability of government funding and the clarity in which the legal responsibilities are established among the government departments involved. In addition, the interviews showed that there may be lack of commitment by the stakeholders. These finding seem to be in agreement with that of Johnston [23] who argues that road safety itself is institutionally complex as it comprises engagements from various organisations which in turn influence its development.

4.2. Coordination

In the previous and current situation, we have the Cabinet Committee on Road Safety as the highest level, which is chaired by the Prime Minister or his deputy.

[(Official)]

At the highest level of decision-making, the Cabinet Committee on Road Safety was first established in 1990 to develop road safety policies, with Road Safety Department (RSD) acting as the secretariat of the meetings. It consists of ministers from 13 ministries which are related to road safety and convenes twice a year. One level lower, the National Steering Committee overlooks and coordinates the execution of decisions made by the Cabinet Committee.

Acting at both federal and state level, the Road Safety Council (RSC) was established in 1950 under the Prime Minister's patronage and its main function is to promote road safety on the ground among the public together with Members of Parliament and State Legislative Members.

Table 2
The RSPM 2006–2010 - Targets and Outcomes (RSD [2]).

Road fatalities indicator	Road fatalities 2006	Road fatalities target 2010	Road fatalities 2010
Per 10,000 registered vehicles	4.0	2.0	3.4
Per 100,000 population	23.6	10.0	23.8
Per billion vehicle kilometre travelled (VKT)	18.9	10.0	17.3

Table 3
Target for RSPM 20147–2020 (RSD [2]).

Year	2015	2020
Expected death	8760	10,716
Mortality reduction targets	6570	5358

However, since RSC is a Non-Government Organisation (NGO), the government established RSD as a department under the Ministry of Transport (MOT). Its main function is, as the lead agency, to promote road safety, increase the public awareness on the significance of road safety and in turn reduce deaths and road accident injuries. RSD facilitated the specificity of MOT in road safety since the MOT deals with all aspects of road and other modes of transport such as maritime, railway and air (see Fig. 3).

RSD was established as a feed-in part of educating which is not present in JPJ or the Police Department. Founded in 2004 to educate road users in becoming prudent and complying to the rules.

[(Official)]

As Malaysia is a federal country, RSD has a branch in each of the states that make up the country. This entails that RSD coordinates its activities with, and acts as a focal point on road safety for, 14 departments in each state. However, the interviews showed that this structure may be complex and therefore demanding in terms of coordination due to the large number of departments involved and overlapping of actions. This is in agreement with the World Health Organisation (WHO) [1] and Hull [24] who stressed that any policy in road and transport management cannot succeed without having an effective coordination among the stakeholders which come from various organisations.

Speaking in terms of structure, based on my opinion, there are too many agencies which results in ineffective coordination on their efforts and overlapping. It will be better if RSD was put under MOT instead.

[(Official)]

In order to enhance the communication between MOT and RSD, there is a suggestion to put the RSD as a division under the MOT and not as an independent department like the current arrangement. It was felt that by doing so, the coordination and communication between these organisations would become easier and effective since it would reduce many communication hiccups between the organisations.

4.3. Legislation

When you are talking about it (legislation), yes of course where road safety is concern, our road enforcement right where it is...I think this law is good enough to deter any motorist from getting involved in fatal accident.

[(Official)]

Our legal framework must align with current situation. So, that's why if there is a need we will review and amend it accordingly.

[(Official)]

In Malaysia there are four agencies with enforcement powers. These are the Royal Malaysian Police (RMP), the Road Transport Department (RTD), the Land Public Transport Commission (LPTC) and the Commercial Vehicle Licensing Board (CVLB). The main legislation that has been in use since 1987 is the Road and Transport Act 1987, (Act 333) and governs every activity related to road in Malaysia. In addition, there is legislation for commercial vehicles and public transport (Vehicles Licensing Board Act 1987 (Act 334) (for East Malaysia) and the Land Public Transport Act 2010 (Act 714) (for West Malaysia)). In addition, there is

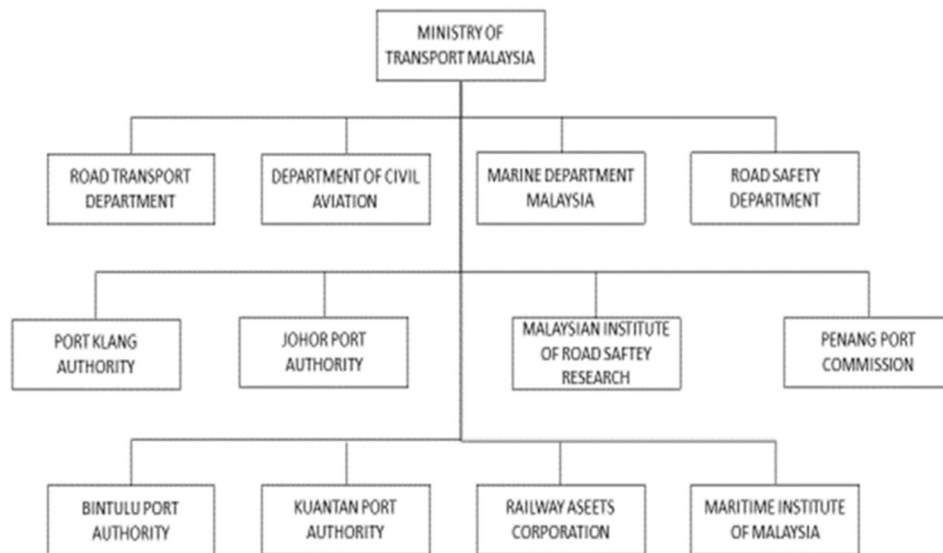


Fig. 3. Organisational structure of the MOT.

legislation (Act 333 has 44 rules) for vehicle construction and use, traffic regulations and offences and helmet and seatbelt wearing [25].

The interviews suggested that at the time period of the interviews the legislative framework seemed to be sufficient to enact road safety. However the interviewees stressed that there has been a need to review the Act from time to time to suit the current situation and needs or, where deemed necessary, to reflect the needs of the other stakeholders.

The judicial structure on road safety is at par with all other developed countries and has been regularly reviewed and enhanced. However, it is implementation of the laws that is lacking. Strict enforcement should be carried out regularly. Besides, more stringent test for public to get their driving license.

[(Official)]

I think it is (the law) very effective. Just the implementations. The law is sufficient...If you break the law, you have to pay the price. But here (Malaysia) is different. You break the law, we compound you but somebody come in between (intervene)!!

[(Official)]

Furthermore, it was found that even though the road safety legislation may be considered as sufficient, there are issues about the independence of enforcement units. There is evidence to suggest that enforcement will be significantly enhanced if its implementation is systematic. Also, in agreement with previous studies, [26,27,28,29], most of the officials interviewed strongly criticised that enforcement of road safety must be strictly implemented without favouritism. It was also found that the enforcement departments such as RMP and RTD, sometimes face difficulties caused by external influences in performing their jobs, which sometimes demoralises them. This is in agreement with the Global Status Report on Road Safety 2013 [30], which assessed Malaysian enforcement levels for speeding, drink-driving, helmets, seat-belts and child restraints as moderate. It also shows that there is need to apply more stringent enforcement on road safety.

In addition, the ADB-ASEAN Regional Road Safety Program Report [25] stated that Malaysia's juridical system was ineffective in prosecuting offenders because of an excessive number of pending traffic offences cases. It seems therefore that there are a number of issues that are not currently addressed by legislation. In addition, the interviews found

that in 2005, an all-encompassing Road Safety Act was proposed to the Cabinet Committee. Another option suggested was to set up a court specifically for road safety offences and cases. However, the suggestions have not been materialised to date. It seems therefore that legislation is also in need of enhancement.

4.4. Funding and resource allocation

It has been suggested that sufficient and sustainable funding can only be achieved by having a secured and appropriate annual allocation [9]. Based on the interviews carried out, it was found out that in Malaysia road safety programmes or activities obtain their funding mainly from the federal government budget on an annual basis.

There is however a mechanism and associated procedures to adhere before the fund is allocated to each organisation concerned. The funds for road safety are channelled first to each ministry which subsequently allocate them to the organisations concerned such as the Road Safety Department (RSD), the Malaysian Institute of Road Safety Research (MIROS), the Road Transport Department (RTD) and the Royal Malaysian Police (RMP). This implies that Malaysian road safety funding depend totally on the government budget and, as a result, it does not consider directly the needs and views of the transport industry and the travelling public. The interviews revealed that the budget is insufficient and unsustainable and follows the general trend that the government budget for fast growing economic sectors with high cost consumes like roads shrinks yearly due to competition with other strategic sectors in the government [31,32].

The funding is never sufficient as there are always other programmes that get higher priority than road safety.

[(Official)]

It is not sufficient. By next year (2015) we are more on advocacy, so means we need more money to go on the ground, to go to rural places.

[(Official)]

In addition, most of the interviewees stressed the problems caused by budget constraints and the competition for funding between road safety and other transport projects. Although there may be many programmes, plans and activities being drafted for road safety, very

few are materialised due to budget constraints. In addition, some organisations face difficulties in allocating the approved fund as they not only cater for the safety of road transport but also of the maritime and air transport. This leads to a smaller share for road safety projects.

In addition the amount of the approved budget allocated for road safety appears to be disproportionate to the increasing number of registered vehicles and drivers in Malaysia for the past ten years. This is particularly worrying as it will hinder the process of improving road safety and reducing the number of fatalities caused by road accidents.

All in all the interviews demonstrated that, funding and resource allocation is felt to be the main challenge faced by most of the departments and agencies responsible for road safety. As government agencies are not allowed to collect directly any form of monetary payment and contribution from the private sector, the funding situation in road safety may exacerbate. This will have a consequent negative impact on the effectiveness of road safety actions.

4.5. Promotion

Road safety promotion in Malaysia is effected at federal as well as state level mainly through media campaigns, advertisements and the education syllabus in Schools, based on the strategies formulated in the current RSPM and Zero Fatality Vision. The Road Safety Department (RSD) conducts road safety campaigns on a continuous basis. The campaigns focus more on speeding, seatbelt and helmet wearing as these are the main causes of road fatalities in Malaysia [33]. Apart from that, RSD has tried to secure public participation in road safety through the 'Community Based Program' involving community and religious leaders, educationists, professional bodies and politicians [18]. As partnerships between the government and the private sector [34] also help in increasing the outcomes of road safety promotion, the RSD has started to form partnerships with several private companies. Currently, RSD have just signed a renewal of Memorandum of Understanding (MoU) with Allianz Insurance in to promote road safety to the motorists.

In addition the interviews found that promotion is supported at the highest level by the Cabinet Committee on Road Safety and that most organisations responsible for road safety are involved in its promotion, with RSD being the lead. The degree however of the involvement of each organisation differs with some conducting it on their own or in collaboration with RSD. This is not the only weakness identified. The research showed that road safety promotions appeared to be insufficient, carried out on an ad hoc basis and for short-term benefits. However it was stressed that promotion needs to be done continuously and systematically to enable sustained communication and effectiveness towards the target audience.

I think in Malaysia we have this thing about the periodical, the big bang, you know before the festive season then on ad hoc basis. It should be continuous.

[(Official)]

I personally feel that there is insufficient promotion. Even if there is, it targets only to a specific group and does not cater overall.

[(Official)]

All the interviewees agreed that promotions of road safety need to be carried out continuously to enable sustained communication and effectiveness towards the target audience. There is a need to avoid ad hoc basis advocacy as well as promotions that are done only on specific timing. At the same time, the interviewees stressed that the quality of advocacy produced should also be improved through the appropriate use of modern communication media such as the internet's social networks. It should be noted however that this issue should be examined in conjunction with the target audience (i.e. road users and society) of the promotion activities.

4.6. Monitoring and evaluation

Actually we monitor the accident statistics on a monthly basis. We have a specific target set as a KPI, for example the Minister's KPI is on fatality index on per 10,000 registered vehicles. This is reported on monthly basis.

[(Official)]

The study found out that the accident statistics are monitored on a monthly basis by the Road Safety Department (RSD). In addition, RSD coordinates the monitoring and evaluation of other road safety information carried out by other organisations. The information thus gathered facilitates the computation of key performance indicators (KPIs). However, the KPI setting is done by the Cabinet Committee and is aimed to provide a consistent safety performance data at the national and local level. This is interesting as it raises questions with regard to the ability of RSD to define its own targets (i.e. effectiveness) and also demonstrates the fragmentation of road safety management. This seems to be in agreement with McLoughlin and Evdorides [35] who argued that weakness in policy implementation may be a consequence from lack of awareness in systems monitoring and evaluation. Therefore, monitoring and evaluation of road safety play a vital role in ensuring any policy which put for implementation is working effectively and will achieve good targeted results. The processes of setting and monitoring road safety performance especially at national level is very instrumental and requires a systematic gathering of traffic and accident data in order to analyse the current performance [36]. In Malaysia there used to be a mechanism to monitor road safety performance based on the 'Safe System' approach developed by MIROS (see Fig. 4). 15 identified road safety KPI would be monitored and evaluated yearly by MIROS and the result of this monitoring would be presented to the Cabinet Committee who would discuss and decide on further directions [37]. But it appears that after 2008, there is no evidence that this mechanism is still being implemented and used in order to monitor and evaluate the road safety performance. In addition, the interviews revealed that this mechanism has been replaced by monitoring the final outcome of 3 road safety indexes as stated in the RSPM 2006–2010 (see Table 2) and continues in RSPM 2014–2020 which were not achieved in 2006–2010.

4.7. Research & development and knowledge transfer

In Malaysia, research activities are carried out by Malaysian Institute of Road Safety Research (MIROS) who develop their strategy and programmes based on the current direction and policies of the Ministry of Transport (MOT) and the government [38]. MIROS has the expertise as well as the capacity to conduct multi-disciplinary research and knowledge transfer. Moreover, MIROS has been appointed as the ASEAN Regional Road Safety Research Centre. This accountability endows MIROS its capacity as a multi-disciplinary research and knowledge transfer not only in Malaysia but also in the ASEAN region [39].

At a wider scale, the appointment of MIROS, who owned the one and only vehicle crash laboratory test in the ASEAN region, to lead the setting up of the New Car Assessment Programme for Southeast Asian (ASEAN NCAP) will create a new paradigm shift in the ASEAN's automotive industry, in line with the UN's 'Decade of Action for Road Safety 2011–2020' providing that it develops a sustainable operational plan.

Despite the above achievements, this study found that there is a view that MIROS as the main research institute should be given more funding yearly to generate more, in terms of quantity as well as quality, on research. In addition, it appears that MIROS income is not regular or sufficient and this may jeopardise its success. Even though, MIROS may undertake a commercialised approach to generate its own revenue from their research or consultation works, until today, this has not been achieved due to certain internal issues. This is a need therefore to address quickly the funding

SECTORS OF ROAD SAFETY KPI		Year			
		2004	2006	2007	2008
1	Coordination And Management Of Road Safety	31.6	55.0	60.6	47.9
2	Road Accident Data Systems	61.7	53.0	65.0	69.7
3	Road Safety Funding	30.6	49.0	39.5	27.6
4	Safe Planning And Design Of Roads	28.6	41.0	46.1	59.1
5	Improvement Of Hazardous Locations	42.6	24.0	30.6	38.3
6	Road Safety Education	3.5	39.0	60.1	63.3
7	Driver Training And Testing	39.7	38.0	49.4	39.8
8	Road Safety Campaign	46.1	53.0	82.9	97.6
9	Vehicle Safety Standards	49.5	53.0	50.5	56.1
10	Traffic Legislation	39.4	41.0	58.6	59.2
11	Traffic Police And Law Enforcement	50.0	36.0	44.3	51.3
12	Emergency Assistance To Road Accidents Victims	46.6	44.0	62.2	62.9
13	Road Safety Research	56.5	65.0	80.2	84.6
14	Road Accident Costing	10.0	19.0	33.0	42.1
15	Partnership	25.3	48.0	44.9	59.3
Average		37.4	43.9	53.9	57.2

Fig. 4. Road safety KPI (Sadullah [37]).

mechanisms of this research organisation since MIROS will only receive a limited amount of yearly grants from the government.

In my opinion we lack of road safety expertise and we need to have more to be able to conduct better road safety related research.

[(Official)]

However, the interviews found that there is a rising need for more road safety expertise in Malaysia. One of the suggestions is to acquire more expertise through international partnership arrangements. In this regard, MIROS has signed partnership agreements with well-established research institute and organisation such as the International Road Assessment Program (iRAP), the Global New Car Assessment Program (Global NCAP) and the Institute of Road Safety Research, in the Netherlands (SWOV).

In addition, the interview data also suggested that human resource management is vital for the implementation of road safety policies at institutional level, and also for their continuity and sustainability so that researchers and decision makers may be motivated and play prominent roles in the development of new knowledge and decision-making process respectively [40].

5. Discussion

The qualitative study presented above investigated in a systematic manner the effectiveness and efficiency of road safety management in Malaysia. However, as highlighted earlier, the findings from this research may be generalised to any country with similar characteristics.

Overall, the research found that the institutional arrangements of road safety management in Malaysia in place are in general in line with the best practices suggested by the World Bank. It is evident however that the key issue which may impede road safety is insufficient and unsustainable funding. This is clearly demonstrated by the findings from the interviews that show that the road safety initiatives in Malaysia appear to be unreasonably dependent on government funding. In addition, based on the qualitative analysis of the interview data, it seems that the key stakeholders in road safety management in Malaysia, feel that funding and resource allocation appears to be the main challenge for road safety in Malaysia like other LMICs. Consequently it is felt that the effectiveness and efficiency of the road safety management system in Malaysia may be sustainably improved if there are other sources of income to replenish the current dependency on the government funding.

In addition, coordination, promotion, advocacy, and research and development seem to be fragmented. There is also evidence of limited partnership between NGOs and the private sector, which in turn may limit the funding needed for road safety. In addition, several departments and organisations are responsible for road safety with RSD as the lead agency. However, due to lack of coordination and communication among them, there is overlapping and replication of functions. It seems that RSD should be given more legislative power to ensure that a better coordination and communication is achieved among the organisations concerned. This is particularly important as more concentrated effort and commitment from every stakeholder is required especially to ensure the success of the newly launched strategic plan. Enforcement organisations should also be empowered through legislation.

The road safety management at institutional level in Malaysia is not significantly dissimilar to those of other countries like those of BRIC. Like Malaysia, the degree of effectiveness of each road safety organisation is unclear [13]. However unlike these countries, Malaysia has established a lead agency for road safety as shown above. With regard to road safety plans, it appears that all countries require further improvements although Malaysia seems to have a more advanced approach based on 'Safe System' approach like that followed in Sweden and the Netherlands. This may improve the selection of appropriate intervention plans and lead to a more effective reduction in road crashes unlike the BRIC countries. However the problem of fragmentation of road safety management at institutional level exists in Malaysia as with the four BRIC countries.

To this end it appears necessary to investigate new and innovative institutional structures and associated funding mechanisms to facilitate the development and application of road safety policies in Malaysia or other similar countries.

5.1. A new option

A promising option to achieve the above is that of creating a dedicated road safety fund based on adapted concepts of cost recovery and commercialisation to country-specific conditions. This option should be seriously considered by the governments to improve the effectiveness and efficiency of the road safety management in Malaysia and elsewhere. It is based on the second generation road fund scheme adopted by a number of developing countries to address the lack of funding in road maintenance and the inefficient system that carries out road maintenance tasks [31]. Such a scheme is felt to be appropriate to address road safety management.

A second generation road fund generates its revenues mostly from road user charges and levies, while the management of the fund is the responsibility of the board that upholds the interest of public (i.e. road users). The implementation of this fee-for-use basis by charging a certain level of tariff to the road users could allow a sufficient and sustainable funding for road safety. At the same time, the concept of second generation road funds could also create a clear link between cost and performance, and revenues and expenses which allow the road users to monitor the performance of the road funds.

The application of the second generation road funds can be diverse due to the increased accountability and improved management prospects compared to the first generation roads funds [41]. There are few mechanisms that can be introduced together with the concept of the second generation road fund. Firstly, by establishing a dedicated road safety fund that will be overseen by a road safety fund board. The fund will receive its revenues through road user charges which will be channelled as funding for road safety aspects through various stakeholders. The road safety allocation and spending will be decided by a road safety board. Stakeholders in road safety that require funding for road safety will need to prepare supporting documents with a well-prepared road safety programmes.

Already there are road funds in certain countries directly allocating a specific budget to provide support on road safety. For example, the Ethiopian Road Fund Board reported that up to 3% of the road fund was allowed to be used on the road safety [34]. Considering other countries, Ghana has already created a road fund to initiate a monetary source for road maintenance which has direct impact on road safety. However the fund has no explicit reference to road safety and addresses only some issues associated with road infrastructure maintenance and overlooks the multifaceted nature of road safety.

5.2. Proposed model

To this end a new institutional model for road safety management is tentatively suggested. It should be appreciated that variants of this model could also be considered but their examination is beyond the scope of this paper. The proposed model involves the introduction of a road safety fund managed by an independent from the Ministry of Finance administrative body, to an existing institutional structure of funding (see Fig. 5). The financial resources for road safety may be obtained directly from road user charges such as vehicle or driving license fees, third party insurance premium, traffic fines, international transit fees and also fuel levy.

Through this arrangement, the MOF will have legal responsibilities for the road safety fund which will allow them to access the fund for monitoring purposes only [42]. However, the main responsibility of this fund will be managed by the Road Safety Fund Administration which will be responsible to manage the collection and distribution of

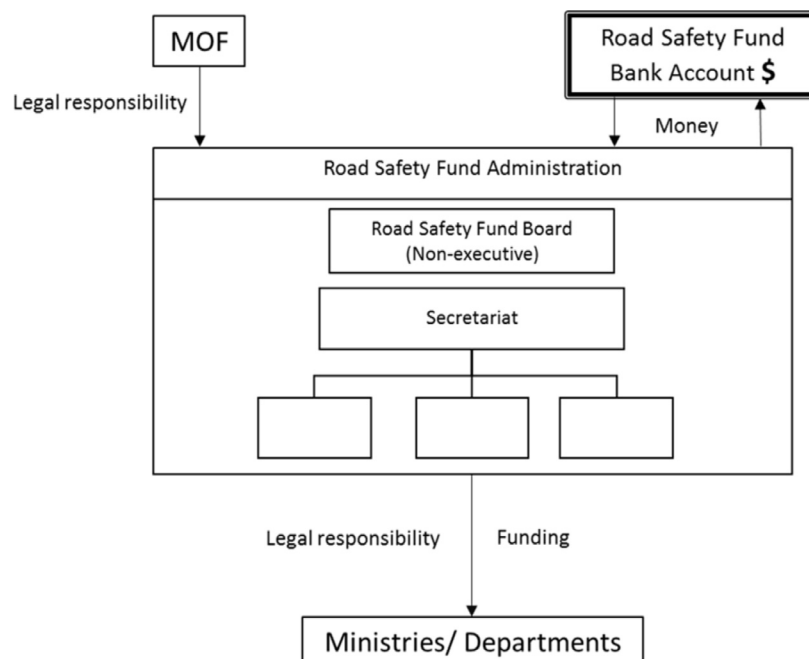


Fig. 5. Second generation funding model.

funds. It may include a non-executive board consisting of members in communication with the Minister of Finance and chaired by a chairman who could be elected or appointed. To gain support from the road users, the board should represent both the public and private sector including road users associations, transporters and business chambers. Day-to-day management of this board may be carried out by a secretariat headed by a Chief Executive Officer (CEO) responsible for assisting the board especially on operational issues. The fund should be established on a sound legal basis, have strong oversight by the board, sound financial management and regular technical and financial audits which will ensure the success of this arrangement [9,31,43].

This model retains the existing structure of the ministries held responsible for road safety. However, the road safety fund board has the overall responsibility to ensure that every activity will be implemented by each ministry through technical and financial audits carried out annually. Competition between ministries may be also effected through cost-benefit analysis of the programmes followed by each ministry, or achievements of targets set. Each ministry and department will have to bid for funds by preparing and submitting their action plans to the road safety fund administration. The plans could be then evaluated by the road safety fund board and the funds allocated for road safety will then directly managed by related ministry or department.

6. Conclusion

This paper presented a case study that highlighted issues in institutional management of road safety and its funding focusing on Malaysia. It suggested the second generation road fund as a tool to improve the efficacy of road safety management. A systematic investigation of the second generation funding model and its variants are beyond the scope of this paper and may be found elsewhere [44]. However the model and its associated concepts seem to address satisfactorily the needs of better road safety management and financing as outlined in the case study. By implementing a second generation road fund model (or a variant of it) using a systematic approach, and both international experience and local knowledge, the funding resources for road safety could become sufficient and sustainable and this in turn would increase the transparency and accountability of road safety management. Support by the road safety stakeholders, road users and ultimately the society could be enabled. Fragmentation of decision making procedures would be minimised together with political interference. This would ultimately increase the effectiveness in delivering road safety and the efficiency of the resources available.

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