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THE IMPLEMENTATION OF INTEGRATED ROAD SAFETY MANAGEMENT SYSTEM IN JAKARTA, INDONESIA

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ABSTRACT

The aim of this research was to know how the Integrated Road Safety Management System was applied in Jakarta. It was predicted that more than ten percent of traffic accidents had caused fatalities and most of the victims in Jakarta were bikers. The research method used was a qualitative method using judgment samples or purposive sampling used for selected informants in helping researchers answer research questions in case studies. The research instrument used was the Strength-Weakness-Opportunity-Threat analysis toward the road safety management system and transportation sector as well as the feasibility study of public road space redistribution and the traffic flow in downtown of Jakarta. The results of this study were expected to result from a national action plan as part of a new transportation policy that is formed in everyday life as self-reflection, mutual learning, active participation and empowerment. The results of this study were expected to produce public safety service products in the form of policies, Standard Operation Procedures, and education to the public of Jakarta. Just standard design could not guarantee road safety in all conditions, so it needed to further evaluation and research to measure the impact of a planning decision on safety.

KEYWORDS: integrated road safety, road transport safety, road safety management, accident information system

1. INTRODUCTION

Road safety is a major concern of global health as most unintentional injuries are caused by accidents that are related to traffic. Based on the data from the Global Health Observatory, there are 1.35 million deaths occurring on the roads around the world annually (WHO, 2011). The World Health Organization (WHO) and World Bank publish The World Report on Road Traffic Injury Prevention in order to improve the global safety (Ricardianto et al., 2021). It is recorded that more than one million people in the world become the victims of traffic accidents and around 50 million others get injured

(ERSO, 2006). In general, although the trend of traffic-related injuries and deaths has declined over the last two decades, these reductions are less significant than the expectation (Mannering et al., 2016). Road safety in Indonesia must be well managed and it needs coordination with the decision makers (Howard, 2015).

As many as twenty-three articles concerning road safety interventions in Africa are identified by (Bonnet et al., 2018) eight specified in the LICs. This framework considers accidents as the nature that arises from technology, individual, and organizational interactions at various levels of system abstraction. Today, traffic accident is still the main problem of road transportation in Indonesia (Sugiyanto & Fadli, 2017; Wulandari & Salbiah, 2017; Maharani, 2018; Saidah, Sari, & Darunanto, 2018). The necessity of a road safety management system which ensures the cost-effectiveness of continuous improvement of road safety is recognized by governments in most high motorized countries. (Ambros, 2012), states that Surrogate Safety Measure (SSM) is both logically and statistically a traffic measurement related to traffic accident. An ambitious target is set by Indonesia as its commitment to the 2011-2020 United Nation Decade of Action program to reduce these numbers by 50% to less than 18,750 deaths by the end of 2020 (Howard, 2011). An action program with the period of five years was established to support road safety; the program runs during the period of 2008-2012. The contribution of activity to reduced traffic fatalities is predicted and the estimate is used as the base year for the forecast (Table 1) (M. N. Yahya, 2011).

Table 1. Estimates of Traffic Fatality in Indonesia, 2010-2035, and Target Reductions under the Decade of Action

| Year | Prediction | | | DOA Target |
|------|-------------|-------------|------------|------------|
| | Population | Vehicles | Fatalities | |
| 2010 | 237,000,000 | 50,000,000 | 32,192 | 32,192 |
| 2011 | 237,521,400 | 52,500,000 | 32,687 | 32,514 |
| 2012 | 238,043,947 | 55,125,000 | 33,189 | 32,189 |
| 2013 | 238,567,644 | 57,881,250 | 33,698 | 30,509 |
| 2014 | 239,092,493 | 60,775,313 | 34,216 | 28,828 |
| 2015 | 239,618,496 | 63,814,078 | 34,742 | 27,148 |
| 2016 | 240,145,657 | 67,004,782 | 35,275 | 25,468 |
| 2017 | 240,673,977 | 70,355,021 | 35,817 | 23,787 |
| 2018 | 241,203,460 | 73,872,772 | 36,367 | 22,107 |
| 2019 | 241,743,108 | 77,566,411 | 36,926 | 20,427 |
| 2020 | 242,265,923 | 81,444,731 | 37,493 | 18,747 |
| 2025 | 244,942,599 | 103,946,409 | 40,462 | 12,866 |
| 2030 | 247,648,849 | 132,664,885 | 43,667 | 10,513 |
| 2035 | 250,384,999 | 169,317,747 | 47,125 | 8,700 |

Source: Yahya (2011)



Decision makers will be helped by IRSMS to develop an evidence-based strategy to lower the number of victims and improve road safety in Indonesia. Traffic Corps of Indonesian National Police in Jakarta has a sophisticated information system called IRSMS. However, the IRSMS has not been implemented yet in all Resort Polices, causing the road safety action guide less implemented (Howard, 2015). This program is the result of collaboration with the World Bank to obtain specific and accurate traffic accident information from all over Indonesia. With this program, in addition to helping officers in Jakarta, it also provides a detailed description of the accident rate analysis that can be accessed by anyone. This program is related and integrated. But for other stakeholders such as, Ministry of Public Works, Ministry of Transportation, Bappenas to fill in each other's information. The people of Jakarta have a web base, this can also be accessed by the people of Jakarta.

Field officers are equipped with equipment in the form of a tablet device that has been equipped with the IRSMS program in it. The officer will input all accident data, the results of which will be sent directly to the admin at Police Headquarters and the people of Jakarta are given access to the korkantas.info site. So, it's more paperless. The main research problem in this research is how is the integration of road safety system management in Jakarta. The purpose of this study was to find out how the implementation of IRSMS in Jakarta can reduce the number of accidents and also to find out how much IRSMS implementation can be useful in reducing the risk of accidents and fatalities.

2. LITERATURE REVIEW

Accident Cause Theory

The relationship between humans and machines, the relationship between frequency and severity, reasons for unsafe acts, and the role of management in accident prevention were first introduced by Heinrich (Hosseinian & Torghabeh, 2012). His theory is known as the Domino Theory. The five domino model suggests that through undesirable traits, people can perform unsafe acts or create harms that cause injuries or accidents (Petridou and Moustaki, 2000). The Domino Theory is developed by (Bird & Germain, 1990) adding the influence of management as one of the factors that cause accidents and it has been renewed to become what is recently known as Multiple Causation Theory. In Multiple Causation Theory, the root cause of accidents is usually related to the lack of a management system (Ranney et al., 2001).

Road Safety Management

The International Standard ISO 39001:2012 (ISO, 2012) publishes requirements and guidelines for safety management systems. Three elements based on (Bliss, 2004) that in the road safety management system are those related to the function of institutional management, intervention and result (Figure 1). Managing the result of road safety needs an integration and accountable response to the elements of this system.

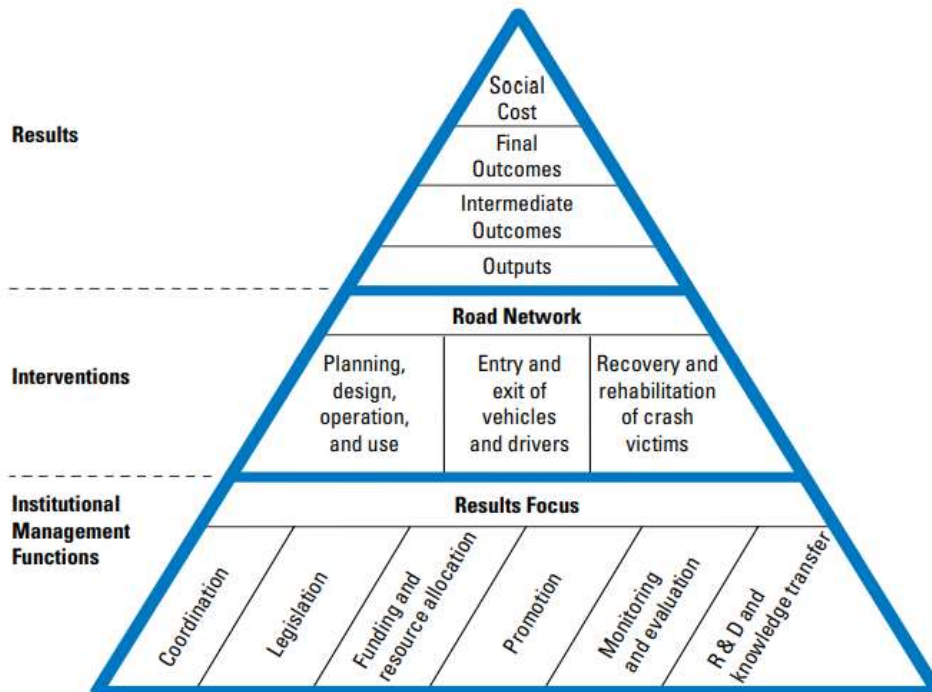


Fig. 1 Model Sistem Road Safety Management (Bliss, 2004)

Road safety management system based on by (Muhlrad et al., 2011), as a complex institutional structure that involves agencies working together and interacting supporting tasks and processes necessary for the prevention and reduction of road traffic injuries. (Bliss & Breen, 2012) suggest that effective road safety management can be achieved through various structural and procedural forms, so it is difficult to identify a good practical model. The purpose of the safety management of road infrastructure is to implement procedures that will ensure that when roads are planned, designed, constructed and used, the risk roads can be systematically identified, assessed for risk of road users, is eliminated and mitigated in the case of injury, death and loss of economic costs traffic accident. Moreover, despite the general belief that better road safety management structures and processes are positively associated with better road safety performance, there are indications that the relationship is more complex and case specific. In fact, the relationship between a country's overall road safety management system, and related road safety outcomes, in terms of road accident victims, has not been adequately explored.

Road Safety Management System in Indonesia

The legal standing for road safety in Indonesia is mainly regulated by Law 22 of 2009, concerning Road Traffic and Transportation. That is, instead of the Indonesian transport agency or public works agency, Traffic Corps of Indonesian National Police has primary responsibility for road safety,



although these other agencies do the maintenance of road safety structure. Based on Law 22/2009, Traffic Corps of Indonesian National Police is responsible for road traffic and transportation safety.

Traffic Corps of Indonesian National Police

Traffic Corps of Indonesian National Police is an independent police agency under the Indonesian National Police. Traffic Corps of Indonesian National Police admits that there is an increasing road trauma in Indonesia, and thus it is necessary to implement more effective traffic policing measures to cope with the areas of road safety risk. A review of the institutional of Traffic Corps of Indonesian National Police has indicated that the organization is disciplined and led by experienced senior officers.

Safe System and Road Transportation System

The United Nations Decade of Action for Road Safety and Indonesia's Road Safety Master Plan are based on the belief that it is possible to improve road safety and reduce road trauma, and that through adopting a Safe System approach we will be able to achieve the greatest future road safety gains. The essential objective of the Safe System approach is to prevent accidents, and, if an accident happens, to ascertain that the released forces of the impact are within the limits of human tolerance and that no loss of life or serious injury resulting in lifelong disability will occur (Salmon et al., 2012). Currently, road users' understanding of compliance with road rules and whether they feel safe even though they are not in accordance with road users' opinions. This means that drivers do not need to know or fully understand why certain traffic laws exist (what they are for), and drivers frequently have misplaced beliefs or expectations that the roads they drive, their vehicles, and other road users are all sufficient to provide a safe place, doesn't seem to depend on the way they drive themselves. For the IRSMS system in Indonesia, the following framework is required to support its effective management, targeting, preventive action and evaluation (Table 2).

Table 2. Considered Elements for an Integrated Road Safety Management System

| | |
|------------------------------|---|
| Framework | Rules of Law 22 of 2009 on the position of the legal system on Integrated Road Safety Management in Indonesia, concerning Road Traffic and Transportation, and related laws. Law 22/2009 stipulates Traffic Corps of Indonesian National Police as the main agency for road safety |
| Practical facts | accident information system with traffic accident data describing who its users are; conditions before, during and after the accident; where; when; how; and, why the accident happened |
| Faith that change can happen | The moral compass for mitigating traffic accidents and improving road safety is provided by the Safe System approach, as expressed through the strategic plan (Road Transportation Safety 2011-2035) and action plans developed to address and guide road safety and traffic police oversight efforts |



Source: (M. Yahya et al., 2013)

IRSMS Project Background for National Road Safety Management System

Following Law 22/2009, Traffic Corps of Indonesian National Police takes over the responsibility for developing the IRSMS. The project implementation is expected to finish by mid-2013. Technical assistance for IRSMS is being conducted by Consia Consultants (M. Yahya et al., 2013). The Strategic Road Infrastructure Project includes a Road Sector Institutional Development component consisting of IRSMS-1, to develop an integrated Road Safety strategy and long-term plan, including an institutional framework; through the Directorate General of Land Transportation, then cancelled, and IRSMS-2, to develop an integrated database or analysis system of road accidents, and set up an independent personnel development procedure for Traffic Corps of Indonesian National Police.

Road Safety Management Systems in Developing Countries Education

Educating residents, and children in particular, about road safety and good road user behavior can help reduce the number and severity of accidents, especially when used as part of a wider intervention package (Esperato et al., 2012; Salmon et al., 2012). As an example, storybook narratives are used to increase the knowledge and improve the attitudes of children in Pakistan towards road safety, and cheap storybooks provide an effective initial strategy to promote behavior change, especially how to behave on the roadside and when crossing.

Enforcement

(Esperato et al., 2012) intended to evaluate the impacts of road safety interventions in LMICs in terms of cost and health, identifying thirteen studies that met their criteria, none of which were based on LICs. Another example of research in this area is a study in Addis Ababa in Ethiopia, where a campaign for shared media and law enforcement reduced drinking while driving by up to 50 percent (Abegaz et al., 2014).

Engineering

Not many researches specifically assess the impact of technical interventions in LMICs (Bonnet et al., 2018), and the available studies have mixed results. Gupta et al. (2015) focuses on regulatory and road engineering interventions to prevent traffic injuries and toll among the users of two-wheeled vehicles. The results of such an accident prediction model and the development of safety performance function indicate a 50 percent higher number of accidents involving pedestrians around the public transport terminal, with a fairly high pedestrian-vehicle interaction situation.

3. RESEARCH METHODS

For secondary data, this study used documents related to theory development, supporting data from



websites (official websites, namely www.bps.go.id, www.who.int), electronic libraries (Science Direct, Emerald) and several journals, working papers, articles (Google Scholar) that contribute to creating a deeper understanding of this issue. Road Transportation Safety strategy document, Law of the Republic of Indonesia of 2009 concerning road traffic and also Presidential Instruction of 2013. This research formulated research questions based on problematization as a methodology, crosschecking the participants in the survey by exploring road users' perceptions of the current road safety management system. while the questions for the informants consisted of 3 things, (1) what are the most important topics concerning road safety issues in Jakarta, (2) what is known about these topics? (3) what would be the most critical future research directions for researchers to consider? During the idea formulation process, certain research was collected from e-libraries and Google Scholar to find studies related to the "Five Pillars of a Road Safety Program" or Decade of Action. This resulted from the national action plan as part of the new transportation policy that was formed in everyday life as self-reflection, mutual learning, active participation and empowerment.

The Five Pillars of Integrated Road Safety Strategy approaches according to (Hakim, 2020) are: (1) Road Safety Management, (2) Safer Roads and Mobility, (3) Safer Vehicles, (4) Safer Road Users, and (5) Post-Crash Response. This research also adds to the chosen approach characterized by the Strengths-Weaknesses-Opportunities-Threats (SWOT) analysis of the transportation sector in Jakarta and by a feasibility study on the redistribution of public road space and traffic flow in Jakarta. Activities consist of; (1) Compilation and data reviewed, (2) Traffic measurement and interviews, (3) Traffic analysis and road network design, (4) Impact assessment of the redevelopment plan and (5) Discussion of findings with research colleagues.

4. RESULTS AND DISCUSSION

Results

(Nantulya et al., 2003) stated that the fact that approximately 85 percent of road traffic-related fatalities and 90 percent of disability due to road accidents occur mostly in low to middle income countries makes road safety an important and recognized global health priority. A study found that the majority of people who died in road accidents in Indonesia were drivers, which is around 64 percent and mainly occurs in two-wheeled vehicles with the least protection (WHO, 2018). The basic problem of traffic accidents in Indonesia is predicted to be an imbalance between the rapid growth of vehicles on the road and the low rate of road construction. This phenomenon is exacerbated by the popularity of motorcycles (Soehodho, 2007). An explanation of the total traffic accidents in Indonesia for the last ten years (2004-2013) is recorded in Figure 2. It is also explained, several classifications of accident fatality rates: fatalities, serious and minor injuries. Although fatalities and serious injuries are much less than those with minor injuries, the percentage is still high.

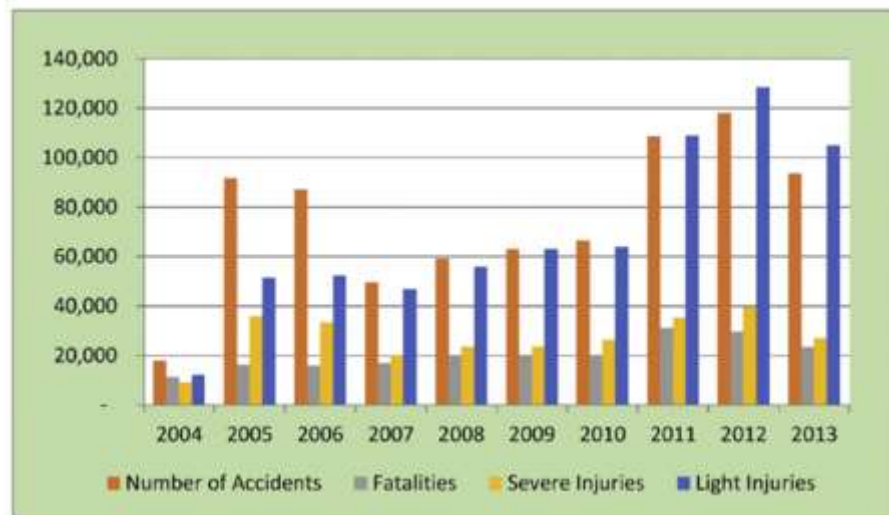


Figure 2 Number of Traffic Accidents in Indonesia and their Classification

Based on the Global Status Report on Road Safety (GSRRS) 2018 which was launched WHO in December 2018, it is known that traffic accidents are still a serious problem throughout the world. The report showed that every 24 seconds, one life floated due to traffic accidents. Every year there are 1.35 million deaths from traffic accidents. Worldwide, traffic accidents are the number one cause of death for children aged 5-14 years and adolescents aged 15-29 years. Fifty-four percent of victims are pedestrians, cyclists and motorcycle users.

Integrated Road Safety Management System (IRSMS) is an integrated road safety management system designed to provide accident data, reliably and can be verified. Information about the accident is the basis for all interventions that target safety on the road. The purpose of using the IRSMS is to obtain information on the incidence of specific and accurate traffic accidents from all over Indonesia, in addition to helping officers in the field, also provide a detailed picture of an accidental level analysis that can be accessed by anyone. Later, field officers will be equipped with Android OS tablet devices that have been equipped with the IRSMS program, so the officers who will input data from the entire accident, whose results are directly included in the IRSMS application.

The purpose of using the IRSMS is to implement an integrated road safety management system, through the IRSMS application including the development of data base accidents and integrated analysis of road traffic systems. Information on accident is the basis for all interventions that target safety on the road. As part of the road safety system management process in Jakarta, it is necessary to be prepared an inventory of road safety issues, considering: the experience of the city government, the

demands of residents about road safety, transportation experience, experience of preschool institutions, health care institutions, driving course and so on. In addition, SWOT analysis was also carried out on road safety system management in Jakarta. SWOT analysis for road safety system management in Jakarta (Table 3).

Table 3 SWOT Analysis on the Road Safety Management System in Jakarta

| | |
|--|---|
| <p>S</p> <ol style="list-style-type: none"> 1. There are legal support 2. Political support, an organization established for road safety purposes 3. Professional Team Competence 4. Local government willingness to implement action plans <p>O</p> <ol style="list-style-type: none"> 1. Road safety strategies 2. Cooperation with the Transportation Secretariat (Local Government) 3. Interests of school and preschool institutions for children's education 4. Interests of the regional government 5. Cooperation with other stakeholders (domestic ministries, traffic police, transporter, ambulance, firefighters, companies and other institutions) 6. Continuous (sustainable) campaigns about traffic safety 7. Media support 8. Additional training/ training from local authorities 9. It is better to use KRL (Commuter Line and Transjakarta) | <p>W</p> <ol style="list-style-type: none"> 1. lack of competence in the operational field of traffic at the local level 2. lack of traffic signals 3. less developed road infrastructure 4. Infrastructure that is not suitable for various needs (people with special needs, children) 5. Control access to high profile roads 6. Institution independence handling traffic and traffic safety <p>T</p> <ol style="list-style-type: none"> 1. Unstable political situation 2. Complex user requirements 3. The implementation of the Law is slow 4. Lack of funds for implementing planned actions 5. Inappropriate use of funds 6. Slowrespon in resolving property problems 7. The slow management of building permits |
|--|---|

DISCUSSION

The sustainable development of the IRSMS will strengthen the institutional environment in which road safety and traffic control measures are planned, implemented. Meanwhile, to base decisions on limited data can lead to unnecessary waste of resources. Road safety data recorded on a daily basis can meet the objectives and be improved with a reliable system and will be used for data analysis. The results will be communicated to the relevant stakeholders. Effective use, can help stakeholders steer



the overall strategy for road safety in Jakarta. Finally, in summary, an alternative that is being carried out in Jakarta is to make minor iterative changes that introduce web-based access to the security database used by the Traffic Police Corps and utilized by all stakeholders in Jakarta. This IRSMS-related research supports the study by (Karnavian, 2018; M. Yahya et al., 2013) mentioning that today IRSMS is an application for accident data recording developed by Indonesian Police that must be used as a basis for decision making and road safety campaign activities.

Based on the result of this research analysis, it is concluded that this research supports the previous study stating that the formulation of road and transport safety action based on the data from the Ministry of Transportation, Jakarta Regional Police and Jakarta Provincial Transportation Agency (Verma et al., 2017). This research is also in line with the study by (Verma et al., 2017) explaining that many drivers have not known the road safety program and road safety management; the awareness of road safety must be socialized. Support from road safety stakeholders, road users and the community is needed for the integration of road safety system management in Jakarta. Fragmentation of decision-making procedures will be minimized along with political interference.

Take the UK for example, where additional revenue generated by traffic law enforcement is allocated to support better traffic law enforcement programs. This stage of road infrastructure safety management requires well-trained staff and the procedures must be implemented effectively. The biggest obstacle is the lack of road safety education in higher education, as well as the lack of professional training and the lack of training standards. Formal training in the discipline of road safety should be initiated through college and further on-the-job training. To facilitate the use of road infrastructure safety management procedures, easy access is required.

5. CONCLUSION

The systems approach in handling road safety includes four aspects, namely: (1) Process, (2) Infrastructure, (3) Management and, (4) Coordination and integration. Road safety cannot be realized only by using a strategy, but institutional capacity is needed through coordination and integration between ministries and agencies by sharing roles in handling various fields related to road safety management. A system approach in handling road safety needs to be done so that the handling is appropriate because the system approach pays attention to the process of change, not just instantaneous conditions (snapshots), considers measurable and unmeasured factors and pays attention to the regularity of parts and maintains stability. The road safety management system approach is carried out with synergy between ministries, institutions and information resource information systems.

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