MANAGING SAFETY ALONG THE ROADS OF DEVELOPING COUNTRIES

El Sayed Metwally

Engineering and Road Safety Departement

Sayed25365@yahoo.com

General Authority for Roads, Bridges and Landtransport, Egypt

Garblt@org.com

ABSTRACT RESUME

- Developing countries suffer from the increase in accidents rates and the corresponding numbers of fatalities and injuries. This is directly related to the overall culture of the people; including discipline, sense of responsibility, perfecting what people do.

- Therefore, the human factor is the major reason for the increased number of fatalities in developing countries.

Furthermore, poor planning of infrastructure requires doubling the effort to overcome the human factors. Add to that the undisciplined traffic caused by the lack of police supervision, since the feel of supervision is part of the enforcement. In addition, the human factor is indirectly responsible for driving as well as the participation of the vehicle as a major factor in road accidents. This is mainly because the human factor is needed for proper maintenance of the vehicle including steering, suspension, tires, lights, wipers, etc. The maintenance concept is key to increasing the level of safety and reducing the impact of vehicles on accidents rates. Additionally, the problem of poor

Road planning, such as constructing roads next to waterways, requires expensive and advanced passive measures.

- Also, traffic accidents increase due to excessive speeding, which is caused by the lack of enforcement and responsibility to one's life and the lives of others.

- Therefore, road safety managers face a tremendous task since most of the road accidents are due to irresponsible human factors, not to mention randomness in entering and existing highways.

- It has to be noted that, the accumulation of incorrect road designs and ignoring proper road safety audits during road planning, and the slow-action in taking proper steps in response to road safety audits are amongst the main reasons for traffic accidents. Furthermore, the effectiveness of traffic measures is very important to lowering the number of accidents. Improper traffic measures can be caused by the accumulation of dust and sand on the road, which cause road marking to soil and disappear. Add to that the improper behavior of drivers who drive on top of road markings, thus reducing its effectiveness as well as its life span. For example, a road in an agricultural area needs to be remarked after 2 to 3 months after marking operations due to bad driving habits, especially by tractors crossing these roads with muddy tires. These non-typical problems require non-typical solutions such as the use of cheap, non- recyclable material for traffic signs, or water blast for cleaning road markings.

    - Political pressures also play an important role in road safety. This is true as certain governmental entities may be responsible for the position of entry and exit locations as well as unplanned crossings through medians.

- In addition, the effectiveness of road safety professionals plays a major role in reducing the number of accidents on the roads. Those professionals need to perform at levels comparable to those of their counterparts from developed countries, despite the deficiencies in training. Finally, road safety gets its importance from cultural and religious values. For example, the Holly Koran states that “He who kills a sole is as if he killed all mankind, and he who saves a sole is as if he saves all mankind”

All these problems will be illustrated in a presentation showing the challenges facing developing countries and the efforts put forward to solve it.

Introduction

The total length of road network in Egypt is about 45 thousand kilometers of which 23.5 thousand kilometers belonging to the General Authority for Roads and Bridges, which is responsible for the maintenance and for establishing and operating the road network. The General Directorate of Engineering and Road Safety is responsible for implementing both the strategy and the plan of the authority in the field of road safety, which has a separate department that is responsible for all the activities related to roads safety, which includes; supervising the implementation of all the means of traffic control in this network. Since, I headed this department; I've reviewed what was implemented together with developing a short, medium and long term startetgies to upgrade the safety activities on the roads to meet the challenges facing

1.The safety situation for the roads for the last 5 years

1.1 Human Resources

***** Having two engineers

* Lack of knowledge and of the stuff awarness for the safety activities on the roads

* Lack of interaction with the international safety schools

* Weakness of the department, concerning the managerial structure of the authority

1.2 Technical Epuipment

* There is just one old computer

* Absence of equipments which assure and confirm the quality of the traffic control means

* There are no offices for the department

1.3 Training

No training programs neither inside nor outside Egypt

No training programs to train the rest of the employees in the road safety field.

1.4 Steck holder relationship

There weren't any signs for the Safety Department at the other stakeholders/partners like; Traffic Departments, Ministry of Health and Ministry of Mass Media

1.5 Traffic control Devices

Weakness of quality levels for the traffic control devices (Marking signs - road reflectors – concrete and steel barriers)

1.6 Data Base

* There are problems in the accident program, together with the weakness of the data base of the road safety

* Accordingly, three strategies were submitted, short term, medium term and long term.

2.1 Short Term Strategy, which was for 6 months and the objectives were

* Solving all of the problems related to the Road Safety projects, reviewing the budget of the directorate and identifying a fundraising vision for safety projects for the roads according to the objectives of the directorate.

* Reviewing the qualities of the traffic control devices, and how to upgrade it.

* Analyising and identifying all of the problems related to the road safety, which is strongly linked to the structure of road safety.

* Developing a strategy to support the technical stuff in the directorate

* Developing a draft to reform the administrative activities and offices.

* Making the employees professionally satisfied

* Looking for international training programs for the stuff and actively participating in the road safety activities

* Identifying the obstacles in the road safet activities, and developing a strategy to reform those activities.

* Copperation with faculty of engineering in univercities to reform the road safety activities, and train the academics on those activities.

2.2 Medium Term Strategy

2.2.1Human resource building capacity:

the directorate was supported by 8 engineers , to have total of 10 engineers

We participated in all of the workshops and confrences for the Road Safety in Egypt. Many engineers have travelled to attend some international confrences and also to attend Intertraffic Exhibition (Holland, Turkey and China)

I joined Piarc Association, and attended the meeting of the association in Malysia, Sweden. Spain. Moreover, I've also attended triaining courses in Singapore and South Koreya.

There were number of international training courses in Germany, Austria, Singapore and South Koreya, as around 100 engineers have joined those courses and shared the experience of those advanced schools in the field of road safety

Some training courses were developed in the field of securing the work place for the contracting companies and also for the employees in the authority.

As for the weakness of the organizational structure of the authority, the role of the directorate has increased in the road safety activities, and for solving many of the problems of the engineering designs and also of the traffic problems.

2.2.2 Technical Equipement

all of the computers were updated , and a computer was provided to every engineer in the directorate through adding those computers on the budget of the Road Safety projects.

New machines were purchased to assure the quality of the road coating/painting

New offices were established for the directirates in the same building

2.2.3 Communicating and bridging with the concerned parties in the business structure , which is linked with the road safety activities:

Strong relationships were established with the General Directorate of Traffic, Emergnecy & Urgency Centre, Imbluance Authority, Ministry of Education and Ministry of Mass Media, through establishing 5 sub committees to manage the Road Safety activities, under the umbrella of the Supreme Council for Road Safety, hosting those meeting in its premises, making an agenda for each committee and identifying specific activities according to the national project to limit accident , and these committees are :

- Infastructure
- Reviewing ,reforming and checking the data of the accidents and the data base
- Vechicle inspection tools
- Legislative laws
- vIncreasing the cultural and national awarness

2.2.4 Traffic contol Devices

2.2.4.1 Road Marking

2.2.4.1.1 Analysing the problem of the bad quality of road marking:

2.2.4.1.1.1 reasons related with level of performance

Difficulty of implementation while the road is open for traffic

Bad condition of asphalet pavement

No usage of good material and the weakness of the Egyptian demands

No usage of modern techniques in pre mark work

Road users do not comply by driving in their lanes during the implementation

Figure (1)

2.2.4.1.1.2 reasons related to the surrounding environment of the roads

Many overlaps among unpaved roads in the main one, which results in : stick of dust on the road marking

Trucks run over the road lines, which make it dirty.

Figure (2)

Figure (3)

Figure (4)

After that we changed the method of application of Extruder instead of spray system to increase the durapility and reflection and building up total quality management system to enhance the performance of road marking by the following procedure

- Coding of the samples should be performed to ensure transparency when tests are conducted
- Purchase of quality control and assurance equipments, such as:
  1. (ZNW 2055) for thickness measurement
  2. (6013) for shine and reflection measurement
- Currently we study to use the performance base of road marking as a method of evaluation of road marking instead of phesical and chemical analysis

Figure (5)

Figure (6)

2.2.4.2 Traffic Sign:

One of the most important problems facing the Authority is stealing of these traffic sign, so it has been thought of producing traffic sign made of materials that wouldn't be recycled and resold afterwards, as there has been an experience in using concrete traffic sign (figure 4) in the Canal and Sinai regions where its proves its success, and this idea had been developed by using **JRB and JRC** (figure 5) in the manufacturing of traffic sign and now the production is undergoing almost **6000** traffic sign.

Figure (7)

Figure (8)

2.2.4.2.1 Development of replacement of traffic sign:

- Find an optimal method for the assembly of the traffic sign with the metallic base, and the installation of this base in the soil.

The method used for the base installation in the ground has been changed, by using the mechanical hummering and changing the cross section shape of the post from the cylindrical shape to the I-Beam shape, and it has proven its success, and it has been utilized in road ways of (South Sinai, Upper Egypt/Red Sea road and Baltim/Kafr El Sheikh tributary), where there was installed almost 15 thousand markings and the theft had been reduced to 1% for the metallic base and 5% for the markings.

Figure (9)

Figure (10)

2.2.4.3 Concrete and Steel Barriers:

Due to the theft of the steel barriers, execution of steel barriers work has been stopped until creating new solutions for them and it is replaced by concrete barriers, and a group of models has been carried out and these concrete barriers has been developed by using a pre-cast concrete barriers.
There is a difficulty in securing the water streams due to the decrease in the width of the unpaved shoulder, a trial section of steel barriers(figure 9) has been produced and it had proven its success, but it has been replaced by concrete barriers as been shown (figure 10) and completely proven its success and 20 Km longitudinally has been implemented, and it had

prevented many of the road accidents and also prevented the mass transient vehicles from falling into the near water streams .

Figure (10)

Figure (11)

We impelement a trial section for Passive Safety Instulation for desert road by using natural earth work besides the road as showen below

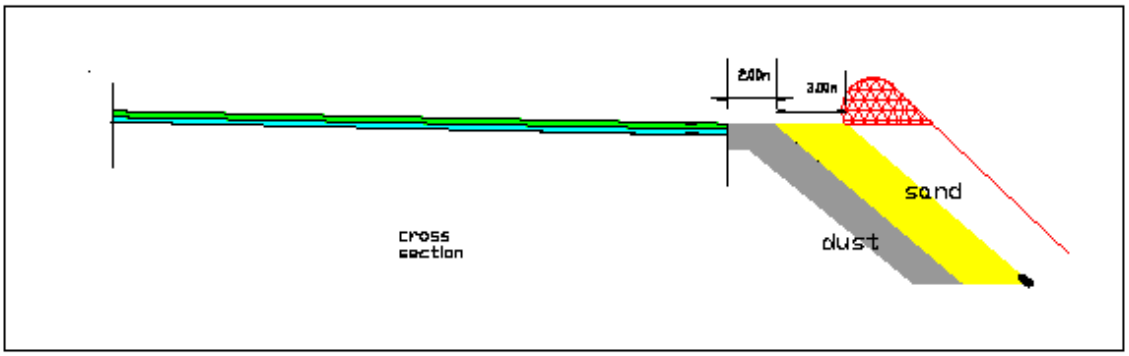


Figure (12)

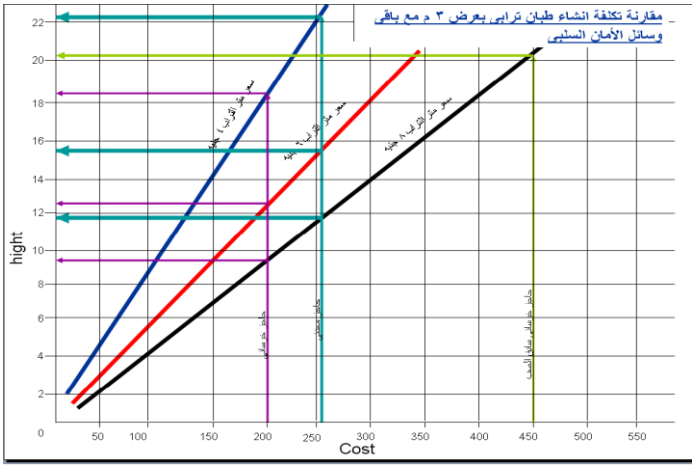
Figure (13)

Comparesion between

The cost of concrete and steel

Barrier, earthwork for passive

Safety instulation



2.2.4.4 Over Head Sign:

A New model for the upper markings has been carried out to avoid irregular altitudes, in addition to the development of new program for markings production taking into account the height and orientation of the writing characters with accordance to the dimensions of the steel sheet of the markings itself.

2.2.4.5 Reflectors:

Implementation of acrylic reflectors to avoid the stealing of aluminum reflectors, and only implement the aluminum reflectors in the road axis with dimensions of 15X15, to force motorists to comply with their traffic lane and not to drive on the ground paints, the method of production of the reflectors has been developed from the casting by the earth gravity method to the mechanical injection method.

2.2.5 Infrastructure problems which directly affects the safety on the roads:

2.2.5.1 The method of passive safety instillation of bridgeschanged from curbs to concrete barriers. There is a model cross section that has been produced to secure the bridges and increase the passive safety factor to reduce the accidents' severty.

2.2.5.2 One of the most serious and complex problems that we are facing is the U-Turns in the dual roads that is of a radius less than 26 meters, it is a major problem because the lack of sufficient budgets to establish free intersections or expropriation of lands that would lead to get safe design of roads, and there had been a strategy carried out to develop some of the roads and convert them to freeways, and the completion of the developed Cairo/Alexandria Desert Road will be soon, and it will be converted into a freeway with a 225 Km longitudinally including four lanes for each direction, in addition to the establishment of service roads on both sides, and the studies of development for Cairo/Ismailia Road and Cairo/Suez Road, in addition to the start of establishment for the regional ring road around Greater Cairo

2.2.5.3 One of the most important problems is acess control, for the side lands utilization is not taken into consideration after the accomplishment of the road's establishment, so it is transformed into a random process (entry and exit), for the avoidance of this problem there have been service roads established for the collection of the entry and exit movements (access control) away from the main road and this would be for the freeways that would be established.

2.2.5.4 One of the complex problems is relieving the traffic movement in residential blocks, as the residents increase the longitudinal level of the humps during execution, and they prevent implementation of the humps that conforms to the specifications thinking that they are reliving the traffic

movement, two models had been prepared for this purpose and change is taking place currently.

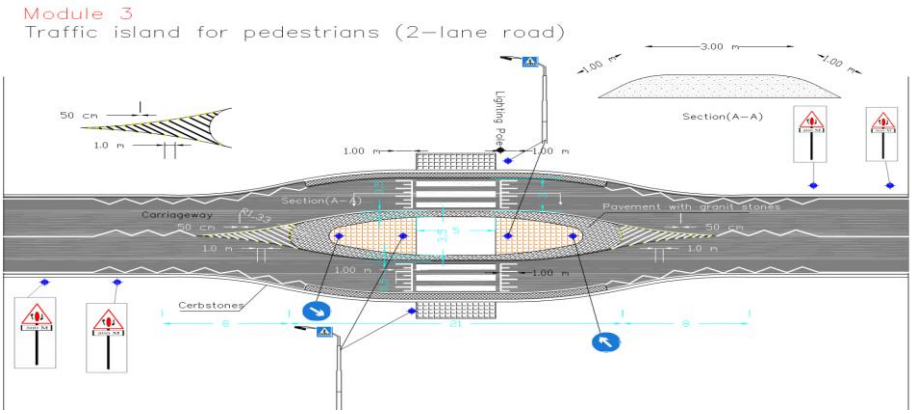


Figure (14)

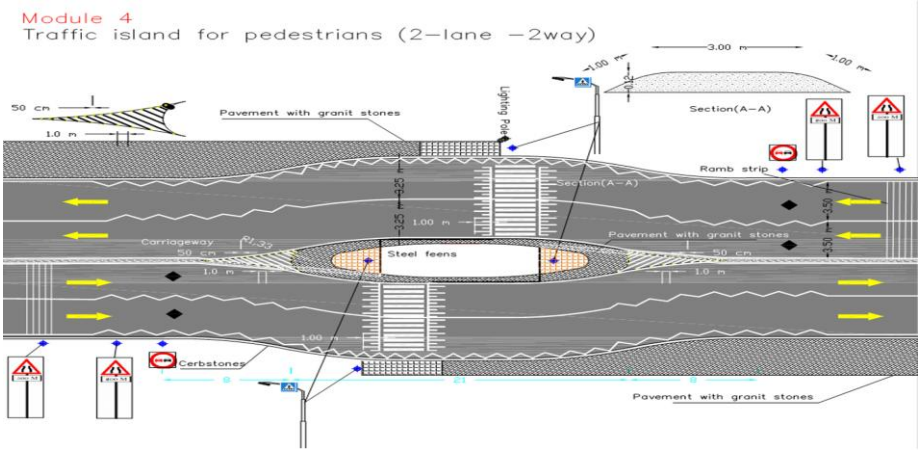


Figure (15)

2.2.5.5 he occurrence of great length spans of road networks close to water streams, and it is because the presence of sharp horizontal curve sin accordance with paths of these canals to protect the vehicles due to the cleansing process of these canals.

2.2.6 - Database was established including several models for a road network:

2.2.6.1 The First Model

A model that shows the location and number of the existing warning, regulatory and guidance markings, in addition to the requirements needed for each road.

2.2.6.2 The Second Model

A model that shows the location of the over head sign needed, exited and condition of the guidance messages on the markings

2.2.6.3 The Third Model

A statement of the black spots for each road.

2.2.6.4 The Fourth Model

Statement report for the torrents sites, and the method used in road destining for these sites, and the presence and status of the industrial work

2.2.6.5 The Fifth Model

Statement report for the services' locations, ambulance and traffic points, integrated service stations and gas stations

2.2.6.6 The Sixth Model

A statement including the sites and locations that is affected by natural factors such as quicksand and places where rain water is gathered

2.3 Long term Strategy

2.3.1 The activation of the national road safety board
The stumbling of the national road safety board is due to the lack of budget funds to convert its activities, in addition to its management performed by the Ministry of Interior; a proposal has been made to transform this board through the establishment of a board Fund through which its revenue sources as follows:

- Taking 5 % from the total value of the violations of traffic ethics fines
- Requesting subsidizing from some international companies, to finance some of the activities
- Implementation of an annual global conference for roads safety, where each ministry would take the secretariat of the council for a four year cycle, and the remaining ministries would avoid working as the secretariat of the council.

2.3.2 Activation of the Administrative restructure for the directorate, and carrying out all the new activities after the restructuring as well as opening active channels of dialogue with the users of the roads' network, creating new activities to increase the financial incentive for the staff of the directorate, creating new motivations and opening new horizons and ambitious opportunities in progress and improvement.

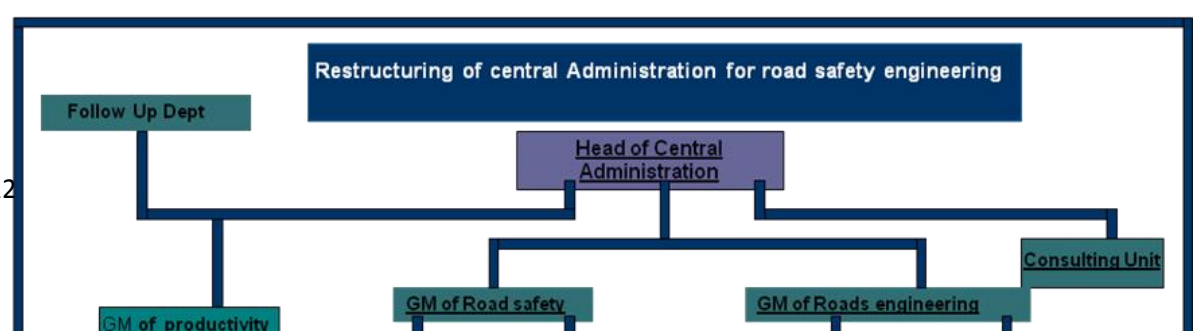


Figure (16)

2.3.3 Establishment of Safety Checks Center on the roads, and there have been an approval from the official entities obtained already to perform the works of the Road Safety Audit, and this mission has been activated immediately.

2.3.4 Impelementation a new program for Road Accidents, using Geographic Information System (GIS), and linking the Accidents program with the database through the same system and with GPS Video Mapping System through the Media Mapping Player.

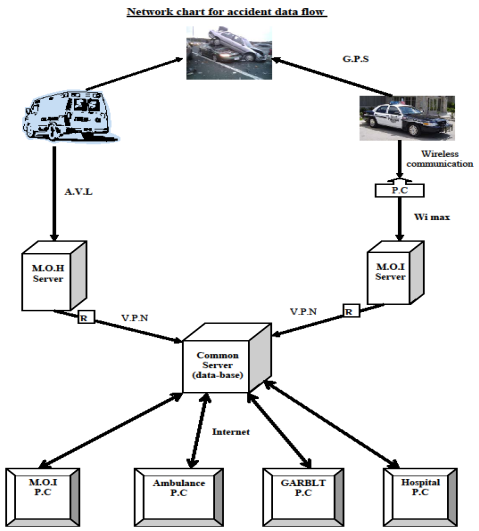


Figure (17)

2.3.5 The elimination entirely of the black spots, in order that we can reduce accidents by 25 %over the range of five years, hence the number of deaths, and the reform of the intelligent traffic management on the important roads and Focus entirely on the operational speed limit especially on theDangerous road networks, along with concentration of Road Safety works on the road network in a routinely manner, and Taking the prompt procedures to avoid the occurrence of any accident

2.3.6 Establishment of counsutat units for providing consulting services For others on the local, Arab and African levels, already many of Consultation services has been provided on the local level, and Some opportunities in the Arab & African countries has appeared In the horizon, the objective of this unit is to fill the skills of the Working teams and achieve the job satisfaction for them on both Financial and moral levels.

2.3.7 Implementation of an International Training program for the Directorate's staff, after execution of the following mechanism: Establishment of a database for the skills and training of the working team Creation of an administrative form or card, defines the conditions needed for the employee in function and the required training courses, through this criteria the development and reform of team skills would be accomplished

2.3.8 Cooperation between the different faculties of engineering in universities to develop the activities of road safety, and training of the university students on these activities, actually this year a training took place for the students of one of the faculties of engineering in Zagazig University in order to enhance the quality of the newly graduated engineer to become qualified as much as possible.