

STUDY ON THE URBAN ROAD TRAFFIC SAFETY MANAGEMENT

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Abstract: With the urbanization process constantly accelerated, it causes a lot of the traffic safety problems. It is a serious subject how to bring down the high rate of traffic accidents through the traffic safety management.

This paper firstly presents the significance of strengthening the traffic safety management through analyzing and studying traffic safety situation in our country at present. Secondly, by the analysis to the relations between the traffic safety management and traffic safety, it finds the every management factors of influencing the traffic safety problems. Meanwhile the analysis to the traffic safety will play the important part in improving the traffic safety management. Finally, the paper illuminates the structure system of the traffic safety management, and further confirms the developing directions and trends of the traffic safety management in the future, making the traffic safety management take the advantage in the maximum extent.

Key Words: traffic safety, traffic safety management, traffic accidents

1. PREFACE

In 90s of last century, the number of people who were killed in the traffic accidents has been up to 700,000 in the world, covering 20% of the number of people killed in all accidents. It also means that one is dead from traffic accidents in every 50 seconds. The traffic safety problem is also serious in China that covers 9,600,000 km² and has 1.3 billion people. Table 1 and figure 1 show the statistics of traffic accidents, the number of injured people, the number

of killed people and the loss of economic in the 13 years (form 1990 to 2003) in the China. From table 1 and figure 1, we can see that the number of traffic accidents, the number of injured people and the number of killed people are increasing nearly by exponent and the condition of traffic safety is deteriorating. So the proverbs that the traffic accidents is more frightful than the tiger and the traffic war that is without gun will be continuous have been widely known. Meanwhile, it proves that the traffic safety is one of the topics that are concerned about by the people.

Table 1. Traffic Accident Situation in every Year

<i>Year</i>	1991	1993	1995	1997	1999	2001	2003
The number of traffic accidents	264817	242343	271843	304217	412860	757000	667507
Ten thousand trucks of death rate	32.15	27.24	22.48	17.5	15.45	15.46	10.82

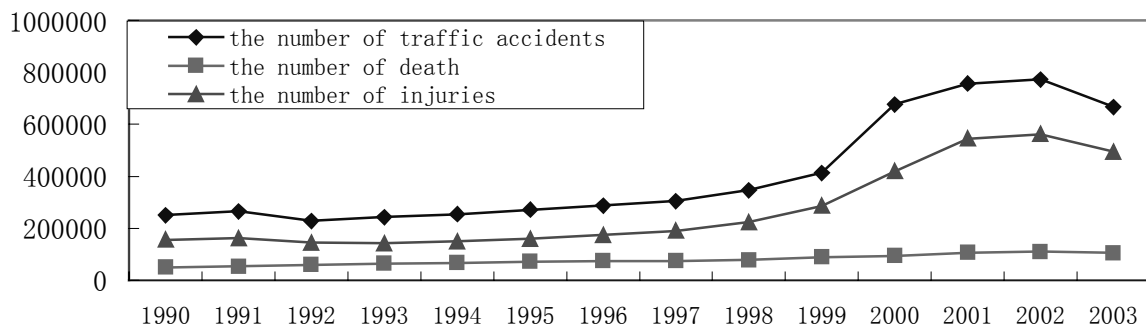


Figure 1. Traffic Accident Varies with Years

Seeing that the high frequency of occurrence and harmfulness of the traffic accidents, the international authoritative organizations which defend disaster—the International Federation of Red Cross and Red Crescent Societies had definitely indicated that the number of people who killed in the traffic accidents is more than that of in the breath disease, phthisis and AIDS (Acquired Immune Deficiency Syndrome) became the number one killer in the world in the report in 1998. In addition, the theme of International Healthy Day in 2003 is the traffic safety and the slogan is that the traffic safety nips in the bud. In China, people have regarded the traffic safety day by day as well. The Safety law of the road traffic that is carried into execution on the 1st of May in 2004 has been an important achievement, which institutionalized the traffic safety continuously in our country. It has fully reflected the spirit that "human being-oriented "and has paid more attention to the protection of the personal security. Accordingly, how to strengthen the traffic safety management to reduce the traffic accidents is a stringent task.

The traffic safety management is that it finds traffic accident's rule, adopts the traffic legislate, makes regulation of the traffic safety management and implements the controls of the traffic by studying on traffic accidents on road, in order to prevent the accidents and reduce the number of the death and property loss. The objectives of management are to reduce accidents

and their severity. There is the consanguineous relation between traffic safety management and traffic safety by the definition of the traffic safety management. The consummate and scientific traffic safety management will improve the environments of traffic and reduce the number of traffic accidents. There will discuss the relation between traffic safety management and traffic safety in the next chapter.

2. RELATION BETWEEN TRAFFIC SAFETY MANAGEMENT AND TRAFFIC SAFETY

Traffic safety management and traffic safety are integrated. The traffic safety management is implemented appropriately otherwise will influence traffic safety. The traffic safety has reflected the current situation of the traffic safety management, by which people will find the existing problem, and improve the traffic safety management. The relation between the two can be expressed with Figure 2.

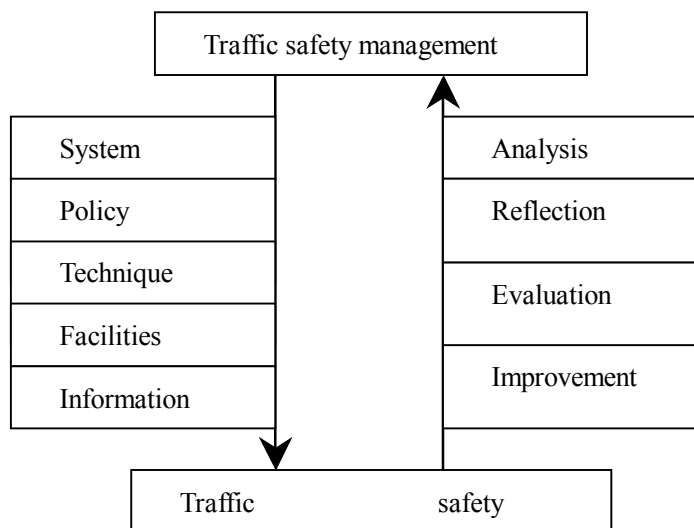


Figure 2. Relation between Traffic Safety Management and Traffic Safety

2.1 The Traffic Safety Management Influences the Traffic Safety directly

The traffic safety management involves the traffic safe administration management (the mechanism, traffic safety policy, traffic safety duty of the traffic safety management), traffic safe practice (driver's physiology and psychology, etc, vehicle safe practice, traffic crash analysis and countermeasure) and road traffic safety facilities (road safety facilities, rescue and aid in vehicle safety facilities, traffic participant's safety facilities, safety education of the traffic), etc (Wang, W. *et al.* 2003). The compatible traffic safety management is prerequisite of ensuring unobstructed road and people's safety, and promoting economic developing. The incompatible traffic safety management will bring very great hazard to traffic safety. The

ubiquitous phenomenon of which the traffic safety management is incompatible has two following respects:

- 1) The management system has not taken to the best function.

For example the consequence of traffic accidents in the road can't be gotten rid of in time, the first aid system can't be put in place, the intersection is dredged unfavorably, drivers who break rules and regulations can't be controlled effectively, facilities of traffic safety are not check outing completed, traffic safety police team is not strength enough and administrations of traffic safety are lacking strict legal system. All these will become sources of the next traffic accident.

- 2) The education of traffic safety is not propagable enough and people's awareness of traffic safety is low.

The propaganda of the traffic safety is an important component of traffic safety management, but the citizen isn't concern about traffic safety enough, not observing traffic rules. For example, they break rules and regulations by traversing the street randomly rather than following the crosswalk, making a dash across the red light, carrying flammable and explosive luggage and smoking in the carriage on transit, etc. Those all will cause the traffic accidents. Meanwhile, the motorcycle accident is serious. It happens occasionally when driving after drinking, going over the speed limit, driving without a license, not wearing the helmet, rushing in the forbidden zone. In addition, for various reasons, training the driver and issuing license in our country is more confusing in small and middle cities, which causes a lot of drivers with faint safety consciousness and inferior technique, and which is one of the reasons happening in important traffic accident.

2.2 Analyses Traffic Safety to Improve the Traffic Safety Management

The analysis of the traffic safety is that it finds out regularity, adopts the positive and effective measure, makes and implements the plan for education of the traffic safety by correctly analyzing the traffic accidents and the current situation of safety management and researching the traffic accident characteristics on road and origin cause of formation synthetically. From long-term strategic objective, it will improve and strengthen the traffic safety management. This means to analyze the traffic safety problems that have happened, then discover the problems in the present traffic management, find the problems existing in present traffic administration, put forward the corresponding improvement measures and achieve the purpose of traffic administration finally.

The traditional traffic safety research approach includes two major types: one is based on traffic accidents research approach and another is not on traffic accidents approach indirectly. The traffic accident research approach is discussed here. The analysis of the traffic accidents

is based on road traffic accident datum happening actually, which are used to evaluate safety, analyses the cause of accidents and predict the accidents. There are two following respects how the analysis of the traffic safety improves of the traffic safety management:

1) Macroscopically analysis

Study the development trends of traffic safety by analyzing the total amount of accidents of the road network and the rate of accidents with various kinds of related factors as basic datum (die /the wounded), in order to make and improve strategy of the traffic safety management. Through analyzing main accidents classification in road network and the way of traffic accidents, differentiating main users who make the traffic accidents, it will offer basis on which take the pertinence measure in traffic safety management. The different grades of road network, and its security is different too. Through differentiating the relation of the grade of road and road safety, make it as the improvement of the traffic safety management and decision basis.

2) Microcosmic analysis

It includes point and line analysis and cluster's statistical analysis. In the research of point and line, the research of the traffic accidents is mainly directing against the certain highway sections or some roads. It analyses the type and the reason of this highway section of accidents, and the time of the accident and meteorological characteristics as well. Its aim is to reveal the potential security problems. It will offer the important basis for making the traffic safety management, which prevents and cures the accidents.

Cluster's statistical analysis is a method for analyzing the influence degree of the road security with different classification accidents and the typical reasons why to cause different classes of accidents. Then find typical positions that accidents happen in, and basically make similar preventing and curing measures by traffic safety management (Guo, Z.Y. *et al.* 2003).

In a word, analyses of traffic safety reflect the traffic safety management, and impel the improvement of the management organization and policy at the same time. At last the traffic safety management will be more perfect.

However, the traffic safety management is not applied widely in China. There are many relatively unattached departments taking charge the traffic safety. So the traffic safety management doesn't take action really, and it is necessary to study the safety traffic management, analyses the structure of its system and develop trends. The content of study will offer gist to people for applying the traffic safety management.

3. STRUCTURE SYSTEM OF THE TRAFFIC SAFETY MANAGEMEN

The traffic safety management includes traffic safety administration management, traffic safety technical management and safety facilities management. The concrete structure system is as Figure 3 shows.

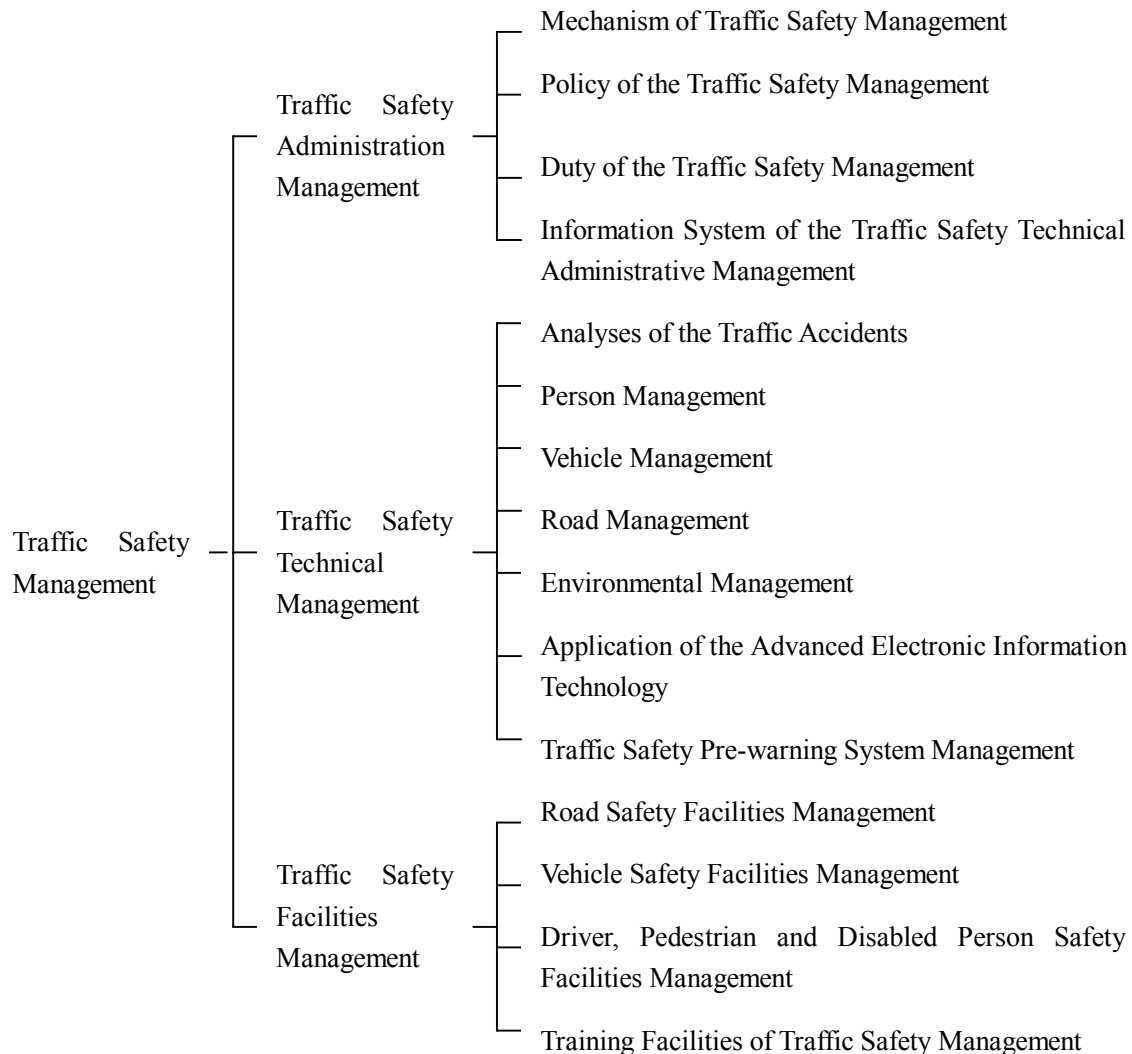


Figure 3. The Structure System of Traffic Safety Management

3.1 Traffic Safety Administration Management

Traffic safety administration management includes the mechanism of the traffic safety management, policy, duty and administrative information system of technology, etc.

1) Mechanism of the Traffic Safety Management

The traffic safety management refers to the construction and maintenance, management of the vehicle, establishment and execution of the regulation of the road, training and management of the driver, traffic participants' understanding of traffic rule, etc. It is a comprehensive and

social system. It involves such a lot of departments as the construction, planning, finance, transportation, law, propagating and educating, etc, and any organizations or departments cannot take over independently. So the project of the traffic safety management should be proposed an authoritative to lead organ to coordinate various kinds of strength of the society in unison. The main content of the traffic safety administration management includes flexible ability, communication means, police strength's allocating, technical equipment, team's quality training and organization structuring, etc.

2) Policy of the Traffic Safety Management

The urban traffic system is an important infrastructure of the city. Its planning and management is belonging to government's functions. Making policy of the traffic safety management is the important means that the government adjusts and controls the development of the city traffic. The main contents of the policy of the traffic safety management include legal system, legislation and executing the law, technical policy, norm and standard, etc. An important policy is to make the sustainable development strategy for the traffic.

3) Duty of the Traffic Safety Management

Traffic participants, roads, vehicles and environment cause the traffic safety problem. And it seems to do not matter with the duty personnel of the traffic, but if the duty personnel are strict on duty, the traffic will supervise participants. Meanwhile it finds and reflects the bad roads, commands and guides the traffic in special climate and environment. In this way, it will have facilitation to the reduction of the traffic safety problems. The main content of the duty of the traffic safety duty management includes the mode of the traffic duty management, post norm, behavioral norm, equipping the standard, etc.

4) Information System of the Traffic Safety Technical Administrative Management

The information system of the traffic safety technical administrative management is to regard computer as the platform, based on database, and make people receive the information of traffic safety technical administrative management accurately more directly. Then it deals with the statistical analyzing, and realizes the man-machine exchange functions in order to make the traffic safety technical administrative management information, digitization and modernization. The main contents include mode, method, form, gathering, dealing with, counting, storing, searching and feed backing the system, etc.

3.2 Traffic Safety Technical Management

The traffic safety technical management is comprehensive, and considered from the influence factors of the traffic safety, it carries on from such respects as people, vehicle, road and environment, etc.

1) Traffic Accidents Analysis

The statistics analytical work of the traffic accidents is the base work in the traffic safety management. It can draw the frequencies and characteristics of the traffic accidents in different regions, different times, different crowds and different kinds of vehicles by the statistical analysis of the traffic accidents. Through judging correctly to description and reasoning of the traffic accidents distribution, it can propose the causes of formation of the traffic accidents, and offer the basis for further investigation. It also offers the important basis to the analysis and judgment of the origin causes of formation of accidents; Statistics of traffic accidents realizes the state traffic accidents happening in and essential feature from macroscopic, and reveal when, where and which kind of condition would tend to cause the traffic accidents. It reveals also the difficult point of controlling and preventing, and point out the directions for the prevention of the traffic accidents; The distribution of the traffic accidents is the basic to prevent the traffic accidents, control countermeasure and measure, and it is the effective evidence of measures examining the accident preventing countermeasure too (Wang, W. *et al.* 2003).

2) Person Management

The person management is considered on defending different fields such as human body, psychology or physiology. Road traffic accidents always connect with motor vehicle together, because only motor vehicle have strong lethality and destroying strength. The motor vehicle drivers are difficult to shirk the responsibility in the traffic accident in the road as the manipulator. Physiology and psychology of driver include driving behind the wine (medicine) and fatigue driving, not obeying the traffic regulation to give way, going over the speed limit and negligence, etc, and those phenomena violating the regulations is become the major part of the causes of accidents. The production of these phenomena, on one hand because some drivers lack general knowledge of driving, on the other hand some drivers generally pursue to the fast excessively. Under the influence of such impetuous psychology, in addition, technology is not really up to the mark, so that it is bring the source of traffic accidents that is difficult to keep within limits. Therefore it should improve psychological and physiological quality of the drivers by the traffic safety management.

3) Vehicle Management

Vehicle is an important element of the traffic system of the road, which has close contacts with traffic safety. Though in the statistic of the traffic accidents, the reason of the driver accounts for sizable proportion, and the accidents directly caused by vehicle problem do not exceed 10%(Guo, X.C. *et al.* 2001), but this does not mean the vehicle has a little effect on traffic safety of the road. It is because this statistic only includes the traffic accidents that the mechanical breakdown of the vehicle causes directly. In fact, if the structure and performance of the vehicle can be improved further, and make the vehicle have intact technological states, this has very important meanings in reducing the quantity of accidents and reducing accident

losses. So vehicle should be managed to improve the safe practice. For example, before the vehicle registers the license, or in the charge stations and vehicle measuring stations, it examine regularly the design of appearance and center of the vehicle, brake technology, slip resistance performance of tire, seat safety belt, safe gasbag, the brake performance, light, steering wheel turning performance in fixed position. It defends and prevents trouble before it happens.

4) Road Management

While human behavior is a significant factor in causing crashes, the road itself is also important because it can have an effect on human behavior. Good roads can also play an important role in reducing accident severity. Those substandard roads, which surface are narrow, low quality and slope heavy and line shape can mislead to the drivers and pedestrians, which cause the emergence of the traffic accident (Lu, H.P. *et al.* 2003). So, check to the special road to pinpoint the problems and put forward the corresponding measures in time, avoiding the traffic accidents to happen.

5) Environmental Management

Environmental management main includes: separating the going of motor vehicle and non-motor vehicle effectively, controlling the road traffic, setting up the essential safety devices, such as the slope falls, cut curved, setting up guard rail, traffic sign, marking, green coverage plan straight road to lightening the driver's tired degree, lighting condition of the road, etc (Lu, H.P. *et al.* 2003). Through the environment of management in the road, carrying on overall and systematic management to the traffic environment, reducing the traffic accidents caused from problem of the traffic environment.

6) Application of the Advanced Electronic Information Technology

Application of the geographical information system (GIS): With popularization and application of computer, utilizing computer to carry on quantitative analysis and make traffic safety decision become reality. Geographical information system (GIS) is one group software of function having figure picture digitization, space data management, inquire about search, model operation and many kinds of output. It is relatively suitable for the research of the traffic safety problems closely related to geographical position. It is by the general and simple visual form showing the distribution, state and connecting of the object. The administrative staff combines the accident datum of the concrete place through understanding the map symbols, and can carry on ocular space thinking, looking for the reason and rule happening in traffic accidents (Li, J. *et al.* 2000).

Application of the intellectual traffic system (ITS): It is the Hi-Tech research work of utilizing the micro-electric technique to carry on in order to solve traffic jam and traffic safety problems. Mainly driving to the traffic safety is the safety drive support system. It includes

offering safety information, warns, the control system, the front barrier warning system, the warning system of vehicle around, supports of system in vision, the distance of the workshop control system, automatic cruises of control system, preventing overflowing outside the lane and the lane automatic tracking system, the vehicle and driver safety inspect of the warning system, and the vehicle automated driving systems in exclusive lane, etc (Lu, H.P. *et al.* 2003).

7) Traffic Safety Pre-warning System Management

The traffic safety pre-warning system management will not only carry on road monitoring, analysis of origin causes of formation, responsibility asserting and compensation for damage, but also should react scientifically. This system should possess the following components:

- The predicting monitors system. According to the traffic running situation, estimate the possible traffic accidents by adopting information gathering and establishing the connecting system. At same time, it is responsible for special messengers to monitor and do every preparation well.
- The warning system. As the traffic running situation worsens further, the more dangerous of accidents increase. In addition, the accidents have already happened to cause the traffic to be confused in some areas. In those conditions this system should be started.
- The urgent system. System should be started while the serious traffic accident appears or happens. It should deal with the accidents that have happened in time, resolutely at this moment.
- The signal communication system. When the accident happens, it use advanced communication equipment and means to contact higher authorities fast, reliably, and deal with effectively in time, guaranteeing the road safe and unobstructed.
- Explain of mechanism. It is used for answering user's questions to the pre-warning administrative system. Explaining the answer of the mechanism includes two respects: First, WHY -- why drawing such treatment conclusion. Second, HOW -- how this kind of conclusion was got. By explaining the conclusion of treatment to problem and elaboration of the course, users will understand the treatment method and basis of the accident, increasing the transparency. Meanwhile it provides convenience for users to understand losses that the accident caused and maintenance system.

3.3 Traffic Safety Facilities Management

The traffic safety facilities management includes road safety facilities management, the vehicle safety facilities management, the driver safety facilities management, the pedestrian safety facilities management, disabled person's safety facilities management, traffic safety training facilities management and rescue facilities management. According to analyses situation of increasing accidents in road appearing our country some city, it is not because insufficient road area, in fact it could not utilize traffic facilities effectively (Guo, X.C. *et al.*

2001).

1) Road Safety Facilities Management

The road safety facilities management is divided into two kinds: permanent and provisional facility management. Permanent road safety facilities management include all kinds of defending facility management to maintain normal road, such as defending the leaving stone, collapse, roll away from, enter, over the speed limit, over lengthy, and ultra wide, showing the way, and leading. Provisional facility management is direct temporary needs against such as constructing line, temporary derangement, temporary parking safe protection management, etc.

2) Vehicle Safety Facilities Management

The vehicle safety facilities management is generally that facilities are managed to prevent the trouble of the vehicle, or the emergency, such as the anti-collision buffers of system, car-following distant security measuring warning system, travel route deviating from, changing the warning system etc.

3) Driver, Pedestrian and Disabled Person Safety Facilities Management

It offers a kind of management of the security service to different traffic participants, for example guiding road to handicapped, leading and offering pedestrian route choose to take refuge and facility management when disaster is taking place.

4) Training Facilities of Traffic Safety Management

The training facilities of traffic safety management are to train the driver from discipline and quality, and propagate participant's traffic safety consciousness education as also. It is a long-term work of getting a permanent cure, and socialized system engineering. With the fast development of economic construction, the security situation of road traffic is becoming more severe, the traffic safety trains and educational work obviously is important and indispensable.

4. CONCLUSION

The traffic safety on roads is an important component of the traffic system of surface transportation, and one of the topics which countries all over the world pay much attention to. The traffic safety management gets great attention of government all around the world too. However, the traffic safety management has been applied freshly and applied in few cities in China. Many apartments are taking charge the traffic safety management, which makes every facets of traffic safety management inconsistent. This paper discusses the structure system of

the traffic safety management generally, and confirms the directions of the traffic safety management development in future, which offers thought and orientation for establishing the traffic safety management plan. Accordingly, the traffic safety management plan makes the traffic safety management have the base on practice concrete policy and measure, and make the traffic safety management perfect further, science and rational.

The traffic security situation of the present is severe in our country, and the traffic safety management is complicated system engineering. By the traffic safety management, harmonize synthetically the relation between road, traffic flow and the administrators, controlling the emergence of the traffic accident of the road, and switching the safety management of urban road traffic to be digital and informational finally.

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