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Full Length Research Paper

Facilitators of traffic accidents management in Islamic Republic of Iran: A grounded theory study

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The high volume of traffic accidents requires a management mechanism so that, by targeted application of human and material resources, time and severity of accidents are reduced and safety of users is improved. Identifying and applying facilitating factors is one of the mechanisms. Qualitative research method with a grounded theory approach was done on 28 samples with Bachelor's to PhD degrees, who had administrative and academic background in the field of transportation and traffic. The data were collected through semi-structured interviews and the study was continued until the data saturation. Data analysis was performed continuously and simultaneous with data collection. Also, to ensure the accuracy of the data analysis, two focused group interviews were held. Facilitators of traffic accidents management were identified as follows: Formulating style sheets, coordinating the organizations, correctly preparing relief agencies, codifying rules and regulations, role of education and culture-fostering, accurate and timely informing, availability of firefighting structure, defining tasks of relief agencies in scene management, using religious potential of people. By applying and implementing the facilitators the performance and status of traffic accidents management, which plays an important role in reducing human and material losses, can be improved in Iran.

Keywords: Facilitators, traffic accidents, management, grounded theory

INTRODUCTION

Fast and safe transportation is one of the prerequisites for sustainable economic growth of countries. Considering the complexity of the transportation issue, its management and fast resolution of road network problems are inevitable for having such a system. One of the common problems in road networks is traffic accidents, which have many consequences such as road safety reduction as a result of secondary disasters, waste of passengers' time, disruption in transportation of goods,

as well as air and environmental pollution. Hence, to reduce the effects of traffic accidents and also perform faster and better handling of accident victims, it is more than 20 years that traffic accidents management has been considered in developed countries. Good performance of road networks is one of the prerequisites for sustainable economic growth in each country. Capacity of roads is limited; therefore, it should be optimally used (Steenbruggen et al., 2012).

In 2003, accidents caused more than 50% of delay in American cities (McCann and Clark, 2004). It has been estimated that secondary accidents cause 18% of all deaths on roads (Guin et al., 2007). 20,408 people were killed in traffic accidents in Iran in 2013 caused by

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inadequate traffic accidents management (Ainy et al., 2014). The negative effects of traffic accidents include increased congestion, probability of secondary accidents, especially with rescuers, increased fuel consumption, and more environmental pollution, which could reduce speed and safety as well as increasing delay. Such a performance decline could cause great damage to the economy of countries (Victims of car accidents eighties look at the statistic, 2014). The study entitled "Presenting incident command system for managing road transportation network" indicated the role of using a unique command structure, which included collaboration of different departments, having necessary coordination, avoiding duplication, enhancing efficiency of the activities of each organization via team-working, and avoiding individual decision-making (Owens et al., 2010). In general, the main reasons for selecting grounded theory as an appropriate qualitative approach in the research on facilitating factors in traffic accidents management include limited knowledge and complexity of the phenomenon in terms of the relevant concepts and its multifaceted nature. Considering the cross-sectorial nature of the transportation issue and decentralization of its management in Iran, coordination between different agencies in response to accidents, absence of firefighting structure, and role of education and cultural-fostering, it is necessary to identify facilitators of traffic accidents management in an integrated and targeted management structure so that traffic accidents can be appropriately responded to and their negative effects can be reduced. Considering the lack of sufficient information in this field in Iran, in this study, grounded theory was used to investigate and identify facilitators of traffic accidents management. Thus, by applying and implementing the facilitators the condition and performance of traffic accidents management can be improved and human and material losses would be reduced in Iran.

RESEARCH METHOD

In this study, traffic accident management systems, including management at strategic and tactical levels (in the accident scene) and information and communication systems based on the experiences and perceptions of the studied participants, were investigated. Also, facilitators of traffic accidents management in Iran were extracted. To access and identify these facilitators, the grounded theory method was used.

In the grounded theory method, constant comparative analysis was used to extract the related concepts. Also, the required information was collected up to the border of data saturation. This theoretical method is achieved by inductive method from daily experiences, interactions, documents, literature, and observations. Result of most of the grounded theory studies is a conceptual or theoretical pattern which tries to describe the studied

phenomenon. In this study which is a part of a large work for designing a traffic accidents management model in Iran, the facilitators of traffic accidents management were obtained (Salsali and Fakhr, 2007).

Using the grounded theory method, concepts can be extracted in the form of inductive qualitative data and then they can be used in a significant way for the development of data-based theories. The three coding stages for the coherent, regular, and detailed development of the theory include open coding, axial coding, and selective coding (Henk et al., 1996).

Conceptualization of data is the first step of analysis. Crushing and conceptualization mean that an observation, sentence, or paragraph is considered and divided into components. Each of the incidents, ideas, or events is given a name, a label that is the sign of the phenomenon or its replacement. Then, by the continuous comparison of the obtained concepts, the main concepts are achieved and, by theoretical sampling, the extracted concepts and classes are saturated (Henk et al., 1996).

Based on the philosophy of interactionism and the selected method, data collection in this study included in-depth unstructured interview using open-ended questions and library study. In this interview, the grounded theory researcher listened to the topics presented by the participants and preferably encouraged them to discuss their interested topics. In the present work, 28 participants were interviewed and then semantic units were extracted from them after rewriting. According to the semantic units and other documents, 1087 primary codes were obtained. After investigating the open codes, the obtained examples and concepts of data were classified in 425 primary classes. Data analysis was also started simultaneous with data collection. From the beginning of the process, the codes were tried to be classified as primary classes in one group. During the data analysis process, 9 cases emerged for the facilitators.

The focused group interview session was held at two stages in the presence of professors and experts in the field of transportation and traffic in about 5 h, in which the issue was discussed in detail and each member expressed his/her experiences. Their conclusions were made within the recognized categories and codes. The main classes, i.e. facilitators of road traffic management, were then extracted.

The letter of introduction and necessary permits from the university were obtained. To ensure the validity of the findings, the researcher considered sufficient time for data collection and got involved with the data via paying close attention to them. In this study, at first, the data were enriched by integrating data collection methods (individual interview, group interview, and library study) and then the extracted data were re-evaluated by holding 2 sessions of seminar and group interviews. To be more precise, the identified cases within the data were criticized in order for the prioritization by holding committee of experts and distribution of questionnaires.

Table 1. The facilitators in traffic accidents management

Themes	
Formulating style sheets	Accurate and timely informing
Coordination between organizations	Existence of firefighting structure
Correct preparation of relief agencies	Defining tasks of relief agencies in scene management
Codifying rules and regulations	Religious potential of people
Role of education and culture-fostering	

RESULTS

The results showed that all the samples were male with the average age of 48.5±3.9 years old. Education of 46% of the population was PhD, 18% were PhD candidates, 25% had Master's degree, and 11% had Bachelor's degree. The facilitating factors of traffic accidents management are the factors that have a great effect on the main topic, reinforce the phenomenon (main idea), and seriously affect the results of the study. In this study, the main idea was traffic accidents management and the items shown in Table 1 were the facilitators in traffic accidents management that could improve the performance of traffic accidents management (table 1).

Formulating style sheets

Guidelines and style sheets can express the implementation method. Using instructions and fast and secure cleaning of pathways, traffic flow can be quickly returned to the normal state. A unique information center can be among the factors for quick and timely presence of relief elements, which will result in the loss of traffic accidents. In this regard, one of the participants stated:

"It is one of the most important problems in Iran that takes many hours, especially in remote areas, and results in some kind of confusion: lack of a primary informing system for all organization as a unique process. It is the most elementary task in all the countries that have done accidents management. In Iran, there is such a capability; i.e. this case may be solved by an instruction. In the discussion on scene management, the first problem is that incident should be reported to a centralized unit by either cameras or drivers. But, how does the communication occur? How is the emergency informed? It is expected to have a by-law along with this instruction which can enable the staff to have better connection with each other."

Coordination between organizations

In Iran, there are some shortcomings in the field of traffic accidents management, not only in structural terms, but also with respect to the coordination between agencies as well as equipment. To develop an integrated management, an integrated structure and high

coordination should be made between organizations and agencies. Creating coordination between agencies and appropriate organization of the involved institutions improve the performance and functional stages in accidents management which could avoid parallel and unrelated activities of the relief agencies involved in traffic accidents management. Definition of the responsibility area for each relief unit, lack of parallel activities in accidents, and necessity of integrated education of rescuers will end up in better coordination of the traffic accidents management.

"The Red Crescent claims to be responsible for rescuing people got stuck in cars and their duty is not relief and transportation. As a result, principle of coordination must be observed based on organizations and coordination should be established between institutions in order to avoid parallel activities and improve the performance of each institution. Capability of all organizations should be determined in order for them to complement each other and take command from their authority. So, authorities should be coordinated with each other; however, it may not occur in lower layers."

Correct preparation of relief agencies

Correct locating in the preparation of firefighting forces and appropriate arrangement and locating of emergency teams and rescuing should be done considering the occurrence probability and risk of traffic accidents, which finally causes timely presence in accident scenes. For this purpose, land use and locating all the welfare and relief services can be used to reduce the loss caused by accidents.

"In many roads, emergency, Red Crescent, road maintenance, and police units are beside each other, while there are none in some other areas. In other words, unit management should locate these units before the accident, each in the closest place with maximum frequency of events. Another thing that is effective for the timing of presence is the preparation establishment of relief agencies, which has not been defined according to needs on the roads of the country. The golden time during which they must be present to save an injured person would be lost due to the lack of preparation. We are losing the golden time; thus, 50% of the losses occur after the accident. A precise analysis shows that the

reason is that the preparation and establishment of relief agencies are not in proportion to the requirement and black spots."

Codifying rules and regulations

The problems of shortage of legal materials for determining tasks of organizations in the management of accidents, sometimes lack of necessity and enforcement in the codified laws and regulations, or lack of authority of most of the activities in organizations in terms of traffic accidents management, which implies inefficiency of the management system, could be solved by enacting the rules and regulations related to transportation and safety as well as modifying and changing the existing regulations based on the up-to-date circumstances and needs in order to have better traffic accidents management.

"Some part of the problem is caused by legal gaps. The new law notified in 2010 which has been implemented for three years was just a beginning; but, there are still many gaps considering the modern needs. In legal terms, the law is not very clear, which may be related to the ambiguity, vagueness, not up-to-date, and mismatch of needs of the society with law. Probably, rapid growth in mechanization and lack of consistency of the law with this mechanization may be the case. In some issues, modeling the countries which are not very similar to us in this regard may cause a problem."

Role of education and culture-fostering

Public education and changing the behavior patterns of drivers and all traffic users are among the most necessary management measures for traffic accidents in Iran, especially before the occurrence of accidents. Thus, by using cultural and media tools, the ground for law acceptance and observing regulations by people and drivers can be achieved.

"Obviously, driving form of people and their speeding model have changed. There was a time when people used to swerve and could not be controlled; at another time, every car could be easily stopped. In fact, culture-fostering has been very important. Sociologists believe that social rules should be turned to ethical rules, because not passing red lights is an ethical rule. In Iran, there is a big problem in the part of preventing and reducing losses, since people do not know what to do."

Accurate and timely informing

By accurate and fast informing and notification to people at pre-event stage and the necessity of prioritizing in the informing process of operational and administrative forces, the performance of relief organizations can be improved. As a result, fast reaction in traffic accidents

management will be improved and the loss caused by accidents will be reduced.

"One of the discussions in the public education which is assigned to the Red Crescent society is related to informing people about events. Another discussion is about informing drivers along the pathway. For example, an accident happens in a tunnel; you can reduce the speed of vehicles from 80 to 60 km in order to reduce the traffic load; thus, the vehicles will gradually reach the tunnel, the problem is solved, and they could pass. In the informing sector, after the occurrence of the event, we desperately need coordination and legal decision-making; i.e. what are informing and responsible organizations. In fact, one of the duties in managing the scene is traffic flow management. When you do not inform the people and drivers entering the scene, in fact, you are making the situation much more difficult."

Firefighting structure

Firefighting is one of the major and effective organizations in accident management. At the time of accidents which end up in vehicle burning, firefighting plays an important role in loss reduction induced by fire. So, the existence of this organization near the black spots is very important and it is necessary to expand the role of firefighting structure in traffic accidents in suburban roads.

"Outside of cities is not in the mission scope of firefighting; sometimes, due to the far distance, they arrive when the car has turned into ashes and their duty is to pour water to eliminate the remaining fire."

"Maybe it is not necessary to have doctors and ambulances everywhere; but, they must be arranged based on needs. There are two kinds of ambulances in Iran: type A and type B, which have different firefighting equipment; but, they are located in the places in which public transportation with heavy transportation equipment is at work. Thus, it is not possible to take advantage of the existing potential of firefighting in the correct locating of these forces."

Defining tasks of relief agencies in scene management

For proper and timely management of traffic accidents, first, the participation and coordination of relief agencies are necessary; second, the involved agencies should know their duties properly and maneuver accordingly in order to implement scene management far from any disharmony.

One of the problems may occur in the following type of situation: Imagine a strange traffic accident occurs and at the same time there is an earthquake. Considering that the Red Crescent employs volunteering forces, if the authority gives the priority to the earthquake victims, no

one will help those involved in the traffic accident. Relief is weak, especially on roads."

"The issue of clearing the road before opening it is very important; thus, the scene manager can use the facilities available on roads and road maintenance organizations (or firefighting in case the event is near cities) to take some measures for preventing further incidents like slippery and fuel spill."

Religious potential of people

One of the facilitating factors in traffic accidents management is the utilization of people's religious capacity and convincing them by religious tools. Thus, people can accompany us in better implementation of rules and improvement of traffic behaviors.

"For example, one of our national and religious standards is avoidance from lying, which also has a cultural ground. Why do people lie? Because they see that lying and passing over some standards could help them achieve a better level. If they do not reach a better level via lying, they will stop in that standard; otherwise, they will pass over it, like the case of red lights. "God is closer to us than our neck veins and He is watching us." We believe that the universe is in the presence of God. We have not internalized this belief; if we have, no one would violate the law."

"When economy and politics do not properly perform their duties and culture does not correctly play its mission, their overflow might emerge in other places. It is not effective to take measures about special traffic issues in a one-dimensional way."

DISCUSSION

Based on the findings of this study, the recognized classes of data and codes were extracted in a paradigm and, from among this model; the facilitators' traffic accidents management were identified in Iran.

Finding of this study indicated that there are some factors that can be used to facilitate traffic accidents management: Formulating style sheets, i.e. relief organizations need a common operational guideline for assistance and relief in the accident scene in a cross-sectorial measure; thus, they could perform their duties synergistically. The existence of coordination between organizations is one of the facilitators that becomes effective and prevents fragmentation and apprenticeship.

Correct preparation of relief organizations is a facilitator by itself. A joint and coordinated operation between partner organizations in the scene of an accident could be timely and fast if organizations have already arranged their establishment plans along the suburban roads, especially close to black spots, in order to attend the scene after the incident in a timely manner.

Responsibility definition of relief agencies: In order for the authority of the accident scene to properly use the involved agencies, their duties should be appropriately defined and described to avoid interference of duties, duplication, or waste of capacities.

Accurate and timely informing is one of the facilitators. This factor includes both prediction of public informing measures for drivers and people after accidents as well as informing mechanism and relationship with the agencies involved in the accident scene.

In Iran, since there is no structure for the firefighting of traffic accidents on roads, planning and implementation of firefighting structure are considered among the facilitators.

Role of education and culture-fostering which has a deep and basic function in the field of facilitating traffic accidents management should have one authority and comprehensive program along with a clear strategy in the field of public training and changing the driving behavior of all the society. Also, the religious potential of people is one of the fast-return factors with a deep effect on the behavioral change of the society if accompanied by juridical reasoning and ideas of religious leaders.

In a similar study in the Netherlands, according to the conditions, set of rules and regulations, and coordinated and organizational relations between institutions, some bylaws and regulations entitled "Role of emergency service agencies in accident management" were developed. In this instruction, the role of each organization was separately defined and information collecting, accountability and auditing, implementation and relaxation, and post-event normalization were described (arms-Ringdahl, 2004).

Review of urban traffic management and the impacts of new vehicle technologies in the UK which was related to accidents management showed that accident management needs extensive multilateral cooperation. All of these studies presented a better understanding about the major accident cleanup as well as roles and responsibilities of each of the involved organizations and provided some recommendations for improving this process (Hounsell et al., 2009).

Applying and performing facilitators can improve the performance of traffic accidents management in Iran and greatly help reduce human and material losses.

CONCLUSIONS AND RECOMMENDATIONS

Improvement in the traffic accidents management in Iran requires the accurate identification of the solutions and factors which facilitate the management of traffic accidents and improve the conditions should be utilized in order to have effective management in accident scenes, more coordination between relief agencies in terms of rescuing the injured, and as a result reduced accidents,

human loss, and material damage in this important traffic area.

The point that is more evident in this research and should be mentioned in the conclusion is the necessity for the availability of style sheets in terms of joint operations of organizations for relief in traffic accidents, precise definition of duties for partner organizations while determining authorities under the supervision of accident scene management, and arrangement and preparation of relief agencies in proportion to threats and damage based on the geography of traffic accidents on the roads.

Using religious capacity and potential of people, it is possible to provide the fields of education in implementing rules and improve driving behaviors in a codified and defined plan.

Finally, it is recommended to comparatively study the model presented in this work while expressing the facilitators in traffic accidents management and considering each and every defined solution. It is more important to administrate and operate each of the identified facilitators in one or more provinces as a pilot study and, by identifying the possible deficiencies and removing them, pave the ground for its implementation in the whole country.

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