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APPROACH TO TRAFFIC HAVOC IN SAUDI  
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# Application of Systems Thinking Approach to Traffic Havoc in Saudi Arabia

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**Abstract – Car accident is a common phenomenon among all countries of modern world. According to WHO, nearly 1.3 million people die each year due to traffic accidents and 50 million are injured (Alhamoud, 2012). However, if this phenomenon grabs a country with a largest number of accidents and fatalities, if hospitals and families are overburdened with growing number of victims suffering from distortion and permanent paralysis, and if number of deaths per million becomes multiple of international rates, it certainly requires to re-access the whole situation to find an effective solution. Any campaign for such a solution must encompass all spheres of society and not only the traffic department. There must be a dynamic planning and long lasting solution. There is a need for Systems Thinking methodology. Systems Thinking has much to offer in strategic planning which is often characterized as an interactive system of related issues. The aim of this paper is to apply Systems Thinking approach to solve the problems of growing traffic accidents in the Kingdom of Saudi Arabia. Systems thinking enables effective decision making for permanent solutions of complex problems. It is an important tool to real strategic planning and decision making. Application of Systems Thinking on strategic planning shall contribute to enhance the capability of solution finding for the traffic havoc by encompassing all the factors, developing nationwide effective planning and providing long lasting solution.**

**Keywords: Systems Thinking, Strategic planning, traffic havoc, car accidents, vehicles, Saudi Arabia, fatalities, injuries.**

## LITERATURE REVIEW

Prince Sultan bin Salman (Chairman of the Board of Directors of Disabled Children) told the newspaper "Al-Riyadh" (Saudi Arabia) published on Thursday (20/4/1435) that the loss of the Kingdom in traffic accidents surpassed the number of injuries and death that many countries suffer from during their wars. He added: "The studies indicate that there are 35 cases of disability per day in the Kingdom because of traffic accidents. It becomes more frightening if we compare Kingdom's population with some other countries that are ten times more than population of the Kingdom on one hand, and the advantage of highly developed and modern road networks available in the Kingdom, on the other hand (Aajil, 2014). Mentioning the study performed by Aramco on physical disabilities caused by these accidents, he said: "As per a study by Aramco, there is a traffic accident every two minutes and the estimates in this regard indicate that the number of people injured annually, is 40 thousand injury, among which 30 % are permanently disabled,

which is equivalent to 35 handicapped on daily basis, and 1,000 disabled monthly."

## Numbers and Statistics

In 2009, total number of accidents was about 484.8 thousand accidents, i.e., 1328 accidents daily, or 55 accidents per hour. The rate rose by 3 per cent in 2010 to reach 498.2 thousand accidents, i.e., 1365 accidents per day and 57 accidents per hour. The number of accidents rose by 9 per cent in 2011 to reach the total number to 544.2 thousand accidents, i.e., 1491 accidents per day, and 62 accidents per hour. The number of accidents rose to about 589.3 thousand accidents in 2012, i.e., 1614 accidents per day, and 67 accidents per hour with an increase of 8 per cent from 2011, and 22 per cent from 2009. 60 % of deaths occurred on the roads outside the cities (Gannam, 2014).

No.	Year	Total No. of Accidents	Accidents on Daily Basis	Accidents Per Hour	Death Per Day	Total Death
1.	2009	484800	1328	55		
2.	2010	498200	1365	57		
3.	2011	544179	1491	62	20	7153
4.	2012	589300	1614	67	21	7638
5.	2013	485931	1334	56	18	6458

**Table 1:** Data related to traffic accidents during last five years.

According to a study conducted by Hany Hassan, assistant professor of transportation engineering at King Saud University, 7,638 people died in road accidents in 2012 (Jiffry, 2013). Arab News columnist, S. S. Jawhar (2014) reported 6,458 traffic accident death in the year 2013 quoting traffic department of Saudi Arabia in comparison with the United Kingdom which recorded 1754 fatalities in 2012.

### Comparison of Road Death with Other Countries

The rate of traffic accidents in KSA is much higher than in developed countries. For an easy comparison purpose we take the year 2011 as base year. As per Saudi traffic police official in 2011 a total number of traffic death reached to 7153 or 20 death per day. In that year, Japan, with four times the population of Saudi Arabia, reported only (5,449) deaths. Germany, with almost three times our population, reported (4,002). In the United Kingdom, with twice our population, only (1,960) were killed in car accidents. By adjusting for the size of population, we can make easier international comparisons. With a population of (28.4) million in 2011, there were (252) deaths per million in Saudi Arabia. Using this adjusted figures, we can see that Saudi rate equals six times Japan's rate of (43) deaths per million, five times Germany's rate of (49) deaths, and eight times the UK rate of (31) deaths per million.

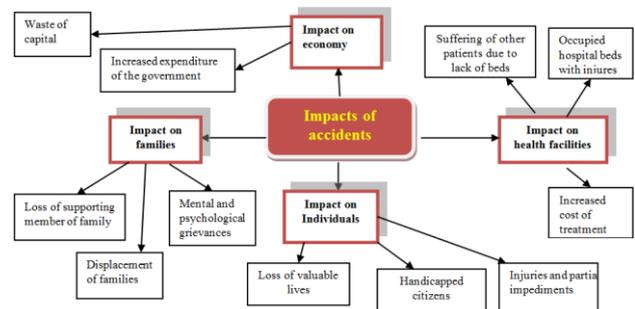
S. No.	Country	Death Per Million
1	Saudi Arabia	252
2	USA	105
3	Australia	57
4	Japan	43
5	Germany	49
6	UK	31

**Table 2:** Comparison of death per million in Saudi Arabia with other five countries.

Let us compare Saudi Arabia's road death rate to those of Australia and the United States. All three are characterized by vast areas, with long-distance travel. In 2011, Australia reported (57) deaths per one million, compared to Saudi Arabia's (252), or five times Australia's rate. The United States recorded (105) deaths per million, a fraction (42 percent) of Saudi Arabia's rate (Aluwaisheg, 2013).

### Human Disabilities and Economic Loss

Kingdom recorded last year, 6458 deaths from car accidents with more than 20 thousand disabilities that represent occupancy rate of 25% of hospital beds of Ministry of Health, thus crowding out many others who need them. This is what was announced by Health Minister Dr. Abdullah Al-Rabiah, during a lecture on the achievements of the Kingdom and the challenges facing the health sector. Following diagram presents the impacts of traffic accidents on different sectors:



**Figure 1:** Spray Diagram of impacts of Accidents

One of the recent studies conducted by the faculty members of King Abdul Aziz University, reveals that the economic loss of mortality associated with traffic accidents is estimated as being 79.92 billion Saudi Riyals while the costs of treating minor injuries reach up to 170.73 million Riyals. The cost of treating injuries amounted to 135 million Riyals, while the cost of damage to automotive reached to 6.94 billion Riyals (Ghannam, 2014).

There is a growing concern of the society regarding deaths associated with vehicle use. The implications of traffic accidents are far more than what are apparent at first look.

The Council of Ministers approved the National Strategic Plan for Traffic Safety that has a key objective of framing a national traffic safety policy specifying broad future traffic plans and measures to cut road accidents (Jiffry, 2013). It is a good move. At this point, it is better to have a brief description of strategic planning and its role in problem solving.

### Strategic Planning and implementation

Strategic Planning is a process of an organization to define its strategy and take decisions how to allocate organization's resources for achieving its goals and objectives. Different types of analysis methods are utilized in Strategic Planning, for example SWOT analysis technique, STEP or STEER analysis etc. Strategic Planning is an official decision around the future course of an organization. Under Strategic Planning, main points to be considered are; what, how and for whom to do. Its process starts from defining problem, then setting a mission and objectives, which leads to a thorough analysis. After that a strategy is formulated. Next comes the implementation and lastly control.

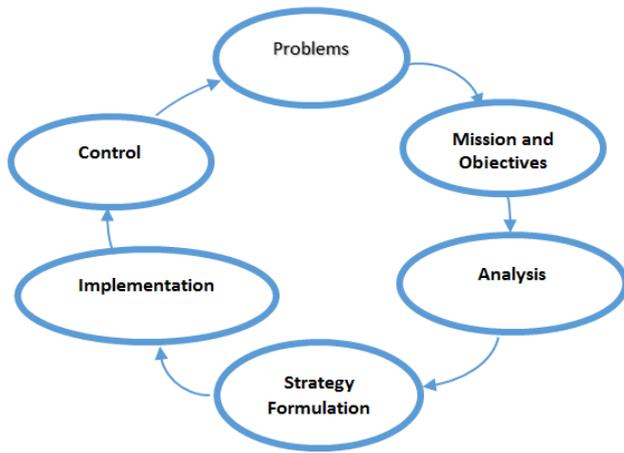


Figure 2: Strategic planning: Process and components

Problems have already been discussed above in details. Mission of this plan is to save the Kingdom free of traffic havoc. Objectives are short term or specialized goals to be achieved to reach to the desired mission and which will be described later. For an analysis of the situation we must first look for the reasons of traffic havoc in the Kingdom. We have to calculate, accumulate and categorize them as per the severity. Once the reasons are sought, finding the solution will be easier.

### Reasons of Traffic Accidents

Accidents come as results of many complicated factors; social, cultural, psychological, technical, educational, legal, political, human and economic etc. These factors manifest in different ways. However, human factor is root cause behind this phenomenon. Impact of other factors can be reduced once human factor is developed in a suitable way to be more complying with the rules and regulations (Al-ghamdi, 1996).

**Younger Drivers:** Younger drivers lack experience. In most countries car crashes are the leading cause of death for teen agers. In Saudi Arabia, 49% of traffic accidents deaths occurred in people younger than 30 years old (Saudi Aramco, 2012). Young drivers in general cases drive without driving license. In many cases, they just want to do an experiment. They commit reckless driving. On the other hand, they are expert enough to change the number plates, or do other tricks that can make them an easy scape from monitoring cameras. There is also not such great education in schools about driving and respecting the road rules and regulations, contrary to Western countries who have such provisions in their schools (Gannam, 2014). There are very little outlets for young people to enjoy themselves and do what they want.

**Distracted Driving Behavior:** The most common dangerous driving activities are speeding, sudden

stops and speaking on the phone during driving. Most of the accidents are result of driver error. Human factors for accidents include aggressive, distracted and inexperienced drivers, having no knowledge of traffic rules. Almost 84% of vehicle accidents are due to the behavior of driver. Distraction results due to many activities such as sending messages, searching radio station, changing CD's, reading, eating, drinking, talking to passengers, engaging in any activity with them and using navigation systems. 25% of accidents cause by talking on mobile. Disobeying traffic light, tailgating the front car, not using proper indicators are such driver behavior that lead to accidents.

**Impaired Driving:** It is another reason of traffic accidents. It includes driving after using the drug or alcohol, driving in sleepy condition, driving with poor eye sights, driving around sunrise, and driving of old age people at night are some of the conditions of impaired driving. While driving in the night, people do not follow the headlight rules. Even within the cities, people drive with full beam light and there is no action from traffic police on this issue. High light reflecting from mirror to driver eyes cause temporary blindness which poses a danger of accident.

**Light Punishment:** The researcher in health safety, Dr. Ahmed Shimi pointed out that there are many reasons that led to increased number of accidents during the past years, like not harder punishment, and limiting it only to financial penalty that does not mean anything much for the perpetrators of the accidents, as insurance companies are going to pay most of them. (Ghannam, 2014).

**Traffic Culture with Lack of Discipline:** It is lack of discipline when you see people sudden and fast turning left out of the far right lane and traffic cutting through parking lots and frontage roads, there are clearly issues with discipline. People are usually seen driving off-road to avoid congestion is another example of bad behavior. Usually, it seems difficult for drivers to stand in queue and wait for turn, rather they would go out of line and thrust their nose from far right or left. Every person behaves as selfish with no sense of preference to others.

**Increase in Vehicles:** A large increase in the number of vehicles and expansion of road networks within and between cities is considered as another reason. This is due to the large national development projects which require the development of supporting transport systems. Increase and expansion came with a high speed. There was a clear misbalance between economic growth and cultural development that could absorb the technical hazards in natural way.

**Mixture of Various Cultures:** Growing number of expatriates from different countries all over the world who bear different habits and cultures, were not able

to shape a standard driving culture. They are unfamiliar with local driving style, habit and requirements. House drivers seem to be always phobic of accidents. They drive too slow being too cautious. Truck and trailer drivers may be seen as ruthless and bold enough not caring about small cars as they are harmless to them anyhow. Rural drivers have free driving habit that is different from urban drivers.

**Poor Road Conditions:** Without clear lane markings, roads can be haphazard to travel on. It is quite apparent in any place even in big cities like Riyadh. Rural roads are also missing demarcation lines, signals, speed breakers and cautionary boards. Contracting companies who dig the roads leave it in unused and dangerous condition for very long time. Speed breakers without clear painting or cautionary board poses threat of accidents.

**Vehicle Condition:** Vehicle condition causes traffic accidents in small percentage. Common types of equipment failure are loss of breaks, tires blow out, broken suspensions and car lights including head light, signal lights and taillights. Tire blow usually leads the accident to be fatal on the highways. Expired and old tires, or poor quality tires are main reasons. Some people purchase used tires for their vehicles to save money. Duplicate and lowest quality cheap tires are always subject to a danger.

**Natural Reasons:** Rain, dust storm, high wind, poor road conditions and potholes, broken drainage lids etc. also cause road accidents. Many people who drive on highway for the first time may face harsh weather effects along with road crossing animals, shifting sands etc. Driving after first mild rain leads to accidents as the roads become very slippery. Sudden rain and pouring water in high speed put the vehicles and drivers in danger.

**Lack of Guidance:** There is no such great education in schools about driving and respecting the traffic rules. There is lack of advertisement billboards warning the people against breaking the traffic rules, not following the safety rule and bad implications of accidents. Anyone can see the advertisement of cars on billboards throughout the year. However, you may seldom see any billboard of traffic havoc or traffic guidance. This shows a great misbalance.

**Lack of Emergency Provision:** Car accident fatalities are due to some indirect factors also. Failing in speedy action and emergency response is another factor that can increase the fatality rate. Inability of qualified medical teams to arrive in time and with the right equipment worsens the accident outcome. Quality of medical care in rural and distant locations is also a key factor to fatality of a car accident (Aluwaisheg, 2013).

### Strategic Planning and Implementation

These are main reasons of the problem. Based on the findings of reasons, we may look for the solution of the

problem and how these solutions should be implemented and controlled to solve the problem in long run. We must benefit from the experiences of those countries that significantly have reduced the ratio of traffic accidents whereas the majority of accidents in the Kingdom had come as a result of negligence in safety rules and tools or as a result of traffic violations.

The size of the problem of traffic accidents and the size of the human and economic resources lost are enormous. It is necessary to implement a national strategy to face this problem. The human factor (the driver) has a major role. By applying the strategic planning this problem can be solved through following measures:

**Strict Enforcement of Laws:** There is major issue of enforcement of traffic laws. Traffic violation occurs in front of all including police. Under aged teen agers are common phenomena. Many cars of youth are without number plate. Window glasses are totally black even the front glasses. Noise of silencer pipe has been made violent in such a way as it is unbearable. High sounds of audio amplifier emerging from car are heard from far distance. Cars are parked wrongly, sometimes even parked in the middle of road. Often the parked cars block the passage totally. All these occur before the eyes of the traffic police. There is a serious lacking of enforcement of law.

**Live police Enforcement:** There is a need for effort to manage safety rather than just managing safety and security together with technology. Live police enforcement, as opposed to just cameras, is highly required. There is really a need to develop a culture of safety by force. Absence of police from the scene at the time when they are required most is common. Police services should not be bound with working hours like the employees of other jobs and services.

**Controlling Poor Driving:** By poor driving is meant a driving with violation of traffic rules, for example, driving at excess speed, ignoring crossing signals, unsafe overtaking and unsafe U turns. This should reduce traffic accidents by more than 50%. All these different types of poor driving can only be checked by live police action and surveillance.

**Heavy Penalty and Punishment:** For those who violate traffic rules, firm punishment must be implemented. In many cases, police appears to be helpless in implementing punishment due to many reasons. Police must be empowered and there should not be any interference by the authorities out of the department in cancelling or reducing penalty or punishment.

**Compulsory Use of Safety Seat Belts:** For the driver and the front passengers, use of seat belts must be implemented. People usually don't realize its importance so they ignore it. Use of safety belts

stops any accidents from being fatal both for the drivers and passengers. It is quite helpful in saving accident victims from paralysis and backbone injuries. Use of seat belts should be made unavoidable by force of traffic police.

**Data Collection and Analysis:** Improving the method of collecting traffic accident data and processing these data to get maximum benefit out of it, is very crucial for traffic study and analysis. In the era of the internet, the old ways of manual recording of these data should be made obsolete. Processed data could be linked to advanced systems of data analysis to produce regular reports to improve traffic safety (Ansari, 2000).

**Fixing the Roadways:** Digging the road in an unplanned way pose a danger to the riders. Contractors who work on the road must be forced to complete their work in record time working during off times and night hours. Broken lids, openings on the road and holes pose danger to vehicles. Stones, fallen materials from trucks and pieces of blown tires cause threat to car drivers. There must be much care towards these little things which result in severe accidents.

**Prompt Rescue Services:** Many accident cases just become fatal only because of inefficient medical and rescue services. There is need for prompt action and emergency response by efficient medical and traffic police team. Quality of medical care in rural and distant locations also require a solution to upgrade their service level.

**Driving License Enforcement:** Still a good number of people drive without valid driving license. It is most common in rural area. Possession of valid driving license must be maintained by traffic police in very strict way. Having valid driving license means much more than just having it. There must not be any relaxation in this regard.

**Surveillance Mobile Camera:** In addition to road sides, such camera should be mounted on police patrol cars also. This is to check impaired and distracted driving. There should be a penalty on talking on mobile, reading, eating and watching TV during driving. The youngsters with high speed and zigzag driving or scating can be watched and penalized. People without seatbelt, drivers with improper or high beam lights can be traced and penalized.

**Monitoring Through Fixed Cameras:** Wrong signal crossing is one of the main causes of fatal accidents. A strict monitoring of 24 hours is required. Cameras have been installed at many signals but sooner they become out of order. They must always be kept in working order. An strict enforcement of camera monitoring is very basic requirement in reducing the accidents within the city.

**Highway Monitoring Using Radar:** Usually on the high ways people drive with a just double speed of what has been fixed for high way driving. There are boards of warning against fast driving and that the road is monitored with radar systems. Since there is no implication of such radar monitoring, people just neglect such cautionary notes. Radar monitoring and penalizing the violators in real time is a great solution to reduce the high tragic accidents.

These were the elements of strategic plan and implementation. Based on this strategic planning, following work plan can be chalked out. Strategic planning and implementation also require a control system that will always be in force to make sure that all the components of planning and actions are carried out throughout the planned period. Strategic plan can be summarized in following diagram.



Figure 3: Components of strategic planning

This is the summary of strategic planning and its components. Of course, if implemented properly, it should have a great impact on solving the traffic problem. However, if we think on this issue on a bigger scale, it will be explicit that there are some fundamental and key issues which are greatly related to traffic problem. These factors are out of the scope of strategic planning of traffic department. Going beyond the traffic strategic planning and thinking on larger scale and linking different causes and effects which lie beyond the boundary of traffic, we find many clues and factors of these problems and consequently their solutions. We have to think using a wider canvas and on national level. No doubt strategic planning and implementation is effective tool and it works, however, effective decision making and learning in a world of growing dynamic complexity requires planners and decision makers to become Systems Thinkers and develop tools to understand the structures of complex systems (Sterman, 2000). Systems thinking are fundamentally different from that of traditional forms of analysis in which the observer considers he the part of reality as a whole system. This procedure results in different

conclusions than those generated by traditional forms of analysis, especially in those cases which are more complex or are having dependence / feedback from other sources i.e. internal or external (Haines, 1998). Usually people like to think in straight lines; moving from cause to effect. Systems thinkers search for feedback and connections. The heart of modern complexity theory is connectivity, leading to the important concept of 'emergence,' resulting from interactions between the parts that make the whole. It is in this sense that the whole is more than the sum of its parts (Blockley, 2010).

### Systems thinking approach

Systems Thinking has gained increasing popularity as it provides a "new way of thinking" for understanding and managing complex problems whether they are local or global (Bosch et al., 2007; Cabrera et al., 2008). The problems that either came out due to the other issues in the past or due to others' actions. Such problems might be very complex including many actors and factors. In some other cases, such complex problems could be affecting or being affected by its closer or farther environment. Systems Thinking integrates all points of view, all aspects and all interests in a given system of multiple interdependent processes to produce a quality (Blockley, 2010). It adopts a wider view looking at larger level and great numbers of interactions leading to understand "big picture" in a better way (Ackoff, 1999). It assumes that effects and causes are not related necessarily in same time or place and that small actions can result in big outcomes. It's philosophy is that if we divide a bird in two it will not give us two small birds. It also stresses on that easing the way of going out may result in coming back (Lane, 2004).

Systems Thinking (Midgley, 2008; Maani, Cavana, 2007) adopts a holistic pattern of covering all dimensions of a complex problem and enables to constitute an effective and long term strategies (Dawidowicz, 2011). It is different from traditional forms of thinking where the problems are broken down in small parts to find out the problems and then solve them. Systems Thinking Approach thinks of the whole system, which results in the insights and new meaning to the initial problem. It works by extending its view by taking large views or parts of any system (Jackson, 2003). This takes us to the conclusions which are quite different from the results achieved by traditional forms of analysis. Systems Thinking leads to find out the root causes of any issue and considers all as a whole system. It stresses on a definite relationship and links us with different dimensions of people lives.

System thinking also provides us an ability to respect and try to understand others' ideas and values. It encourages to look into various perspectives of any issue or problem. A systems thinker incorporates the insights of others as well. Systems Thinking leads to think critically examining continuously even own thinking, opinion or decision (Gharajedaghi, 2011).

### How Systems Thinking Contributes to Strategic Management?

Systems Thinking is different from Strategic Planning. It goes deeper to find out the problem reasons. The result of application of Systems Thinking is a long term solutions by working on all possibilities while in Strategic Planning, we remove the reason of problems one by one as per the plan. The success of Systems Thinking results in the change of organizational and institutional culture. It can help a lot to Strategic Planning. Systems Thinking in strategy includes different concepts and it regards decision making as complex situation that comprises on various issues and many stakeholders. With the implementation of Systems Thinking any organization can overcome its complex problems and perform better. It leads to deep search for problem sources and produces solution to problems by applying holistic approach which includes the elements outside the boundary of problem (Batra, 2010).

### Traffic Havoc and Systems Thinking

Effective problem resolution is a result of understanding the system that created the problem. When we understand the complexity of the situation, we are better able to think and act in ways that produce desired results. The benefits of Systems Thinking include more effective and sustainable results in the long term saving time and money. Systems Thinking effectiveness in problem solving is carried out through several steps; analyzing specific situation, diagnosing the system in which the situation is occurring, identifying leverage points of action that are possible and sustainable in the given situation, using processes and tools to take effective action, and being more effective in planning, managing performance and anticipating results.

### Outcome of Systems Thinking Approach

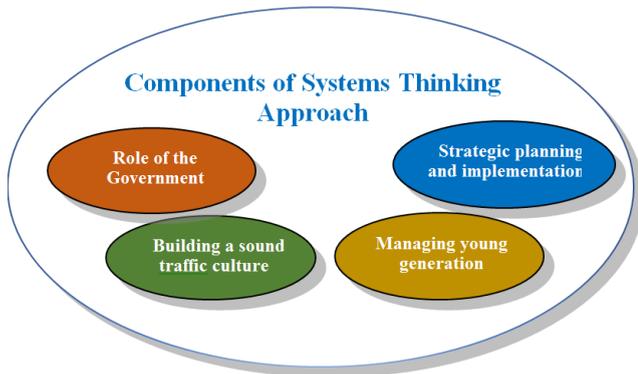
By applying Systems Thinking Approach and dealing the issue in broader spectrum, many other issues in addition to the strategic planning, come out which have direct and indirect link with the havoc of traffic in KSA. These are as follow:

- 1- Strategic planning and implementation
- 2- Role of government
- 3- Building a noble traffic culture
- 4- Managing young generation

These issues are not covered by Strategic Planning and Decision Making. A Systems Thinking leads to holistic approach including these four factors or solutions that can solve the traffic havoc of Saudi Arabia. We will discuss these four elements one by one. We have already discussed the strategic planning and implementation. As per the Systems

Thinking approach, strategic planning appears to be just one of many other solutions. It also means that strategic planning is not the only solution of the problem. Many other factors and solutions must be considered. In other words, we can say that traditional strategic planning to be really effective must encompass Systems Thinking approach to be a real nation-wide strategic planning.

The following System Map Diagram shows four factors or issues which can contribute profoundly in solving the complexity of traffic havoc.



**Figure 4:** Systems Map Diagram showing four major components of solving traffic havoc.

As we discussed earlier, Strategic Planning and Implementation will have a great impact on reducing the traffic havoc. However, contribution of the government in solving this problem is urgently required. Without an active role of government with the following main objectives, problem will be solved in a partial way only. Let us see how the government can contribute in this regard.

**Role of the Government**

Main role of Saudi Government in dealing with the traffic havoc and solving its different problems can be summarized as follow:

**Independent Presidency/Ministry of Traffic:** Great implications of traffic accidents on the society and large number of employees associated with the traffic department along with huge budget necessitate the traffic department must be develop and re-established as an independent organization either in form of a presidency or ministry. Problems associated with traffic department are much more than some other existing ministries. Solving traffic problem needs empowerment of traffic department with all required arsenals to fight against the terror on road. True empowerment can't be achieved but by an independent identity of traffic sector.

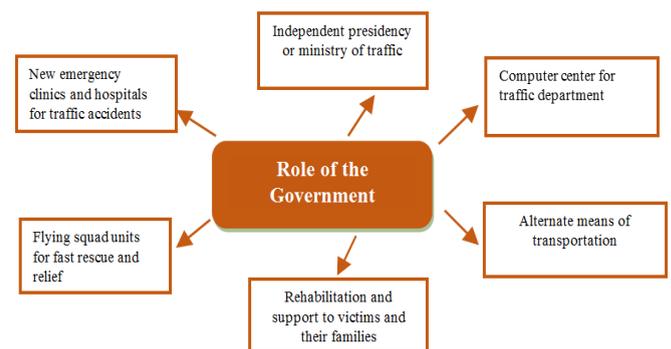
**New Emergency Clinics and Hospital for Traffic Accidents:** Due to high pressure on existing hospitals,

it is important to establish general hospitals for treating those traffic victims who need long stay at hospitals. Similarly, new traffic clinics specialized in dealing with traffic victims should be established in those areas which are far from the main cities and fall in the zone of traffic accidents.

**Rehabilitation and Support to Victims and Their Families:** Families who lost their earning members or the families whose earning men became handicapped, or the families who are unable to continue with longer and expensive treatment are in need of government support by some way or other. There must be provisions by the government to minimize the impact of traffic dilemma on the society.

**Flying Squad Units for Fast Rescue and Relief:** There is need to maintain helicopters, flying medical rescue team and ground medical team who are able to reach to accident place in record time. We must learn from developed countries and try to adopt the same humanitarian culture. We can do it in a far better way as it is part of Islamic religion. There is also need to make the current ambulance services more efficient and prompt.

**Alternative Means of Transportation:** Intercity train services will have an impact on reducing the passenger and freight movement through roadways. Metro services inside the city can be started to reduce the urban traffic. Cheaper flights along with a special airport terminal away from Jeddah city for pilgrims can change the traffic situation on road a lot. Cheaper bus services, offering a complete package for Umra and Ziyara along with hotel provisions are doing well. However, there is much more potentials to develop these services. There is a market gape for business planners to manage air trip along with hotel provision at economic rate. All these measures will reduce the pressure on road travel.



**Figure 6:** Spray Diagram showing the role of the government in solving traffic problem.

**Computer Centre for Traffic Department:** A modern computer and research centre will facilitate many tasks of traffic police with its sophisticated and intelligent programs, collecting the data from the very

accident place through a handy computer that will record the details of each accident and will be accessible through the traffic website. It will work as a live source of information for ambulance service, insurance company, security police, traffic police, rescue team, flying squadron, concerned clinics/hospitals, vehicle towers, relative and concerned people of victims in the accidents. It will also provide an authentic database for further researches within the traffic department.

These are some salient feature of government role. The third pillar of Systems Thinking methodology is building a noble traffic culture. Here, every person can join hand. Every driver who is on the road can demonstrate a noble culture in practice by preferring others and through maintaining the rules and regulation as first priority to follow. We will discuss building noble traffic culture issue in details.

**Building a noble Traffic Culture**

No one can deny the fact that we are in need of a noble culture of traffic. The growth in the number of vehicles, roads, infrastructures, factories, buildings, bridges, etc. came with such a speed that cultural development lagged behind. Educated and qualified population grew with the time and still growing. It is a time taking process. Once the graph of educated population reaches to required level, this will manifest in improvement of traffic culture too. On the other hand, unskilled expatriate drivers who constitute a big part of traffic culture, major portion of them has no or limited sense of traffic culture. They are mainly: company’s drivers, heavy vehicle drivers, taxi drivers and home drivers. They mostly follow the traffic rules and avoid traffic violation, still they miss traffic culture. A big portion of them is illiterate and most of them are even unable to read boards.

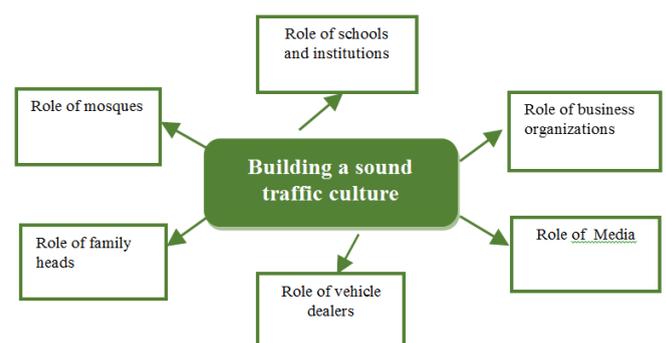
Kingdom has to build a sound driving culture. Under strategic planning this goal is achieved by force. Other sources and means will do it through teaching, persuading, generating conscious and informing the society with the consequences of absence of this culture. Developing a high level of traffic culture is a responsibility of whole country including all its organizations which could work as a source of required traffic culture. This issue is out of the boundary of Traffic Department or Ministry of Transportation alone.

**Role of Mosques:** Mosques can play a very important role on molding natives and expatriates towards developing a required traffic culture through weekly Friday speeches and casual general preaching sessions. Islamic code of conduct, good manners and noble behavior can be stressed upon in relation with the vehicle driving. How Islam has forbidden from entangling with other property, life and peace. Frightening others and causing any sort of harm to human is not allowed in Islam and so it is illegal. How each person is responsible for his/her own activities

and conduct wherever he might be. On the other hand, preachers can present the data of victims in details exposing that how the society is suffering due to this havoc. They should repeat this issue with its different aspects. It will have a great impact on the society. It, for sure, is going to be very helpful in developing a noble traffic culture.

**Role of Business Organization:** Whenever, a traffic violation is recorded or accidents take place, there should be a system to inform it to the sponsor, work place and guardians. All organizations must give tutorials to their employees about traffic rules and regulations, safety measures, vehicle problems, penalty or punishment that he can be subject to in case of violation and accidents. Employees should be given written manual prepared in Arabic/English/expatriate language to get them fully introduced by laws and regulations. Repetition of accidents by employees should lead to termination of job. Any organization failing to teach and train its employee in proper way must be subject to a penalty.

**Head of the Family:** For any single violation committed by family member should be reported to family head too in the form of short message format as well as hard copy letter to be delivered through courier. This should be a part of automatic systems linked to violation registration at traffic police. Upon the repetition of violation, the head of the family should be notified and deprived from the car license involved in the violation. Family heads should warned against misuse of family vehicles by their young children. They should not encourage their children to drive with their families without license or before legal age. They should have an eye on them during the period of exams, vacation, soccer matches and others when the youngsters go through high excitement.



**Figure 5:** Spray Diagram showing the components of building traffic culture

**Schools and Academic Institutions:** There should be full-fledged course/curriculum taught at intermediate / high secondary level related to safety, traffic rules, accidents and its consequences etc. It should comprise on theoretical and practical part. Within the practical portion, passing in driving, technical maintenance and practical know how should be must. There should be some chapters in

different classes in the moral science and religious curriculum that should focus on the importance and obligation of practising true Muslim roles on the roads while driving. Accordingly, there should be chapters in the course books of different classes on the safety and security of driving and the consequences of road accidents on the society. Institutions should hold symposium and workshops on traffic havoc. There should be campaign in schools under theme of "safe driving" or "abiding by the traffic rules", etc.

**Role of Media:** Saudi Media can play an important role in developing the sound driving culture. We find that media is full of all sort of advertisements except the ads of safe driving. Traffic havoc is missing from the television, satellite channels, newspapers, journals, symposia and conferences and even from billboards. People should be informed through all means about the dangers they are up to every day they go out of their home. There should be documentary films prepared and presented in different patterns and styles round the year. Live interview from those people should be broadcasted who underwent such bitter experience. There must be an unique experience with each victim which could prove a milestone for every driver. There should be open air discussion programs on Saudi radio. Media campaign should be carried out by traffic department.

**Role of Vehicle Dealers:** We find billboards of new cars throughout the year but not a single billboard that warns the citizens against the dangers of road terrorism, or talks about safety measures. Vehicle dealers should be instructed to add cautionary notes, safety slogans, consequences of misusing of vehicles etc. along with each poster they put on the billboards. Alternatively, they can be asked to put an advertisement of traffic havoc after each promotional or sale advertisement of their products. Failing in doing so, they should not be allowed to advertise through billboards.

With this we came to an end of third pillar of Systems Thinking approach which was related to building a noble traffic culture. Now, the fourth and last pillar that is about managing young generation will be discussed. As it has discussed under the Strategic Planning, human factor is a major factor in traffic havoc and young drivers constitute the major part of human factor. Many more reasons and factors of accidents are associated with the young generation. The question is how to manage the young generation so that they turn to be a productive factor and not the destructive one.

### **Managing young generation**

Reckless driving of youth putting themselves and others in dangers, indicates their frustration and anger towards society. Suffering of young generation refers to many reasons and factors. Some of them are self-

made by themselves as they are not serious in their education or job. Many of them look for a short cut to a rich life style. However, most of the reasons lie outside of them. Applying Systems Thinking approach, we may understand their problems. We have to see them with their own eyes and not by ours. Facilitation, guidance, monitoring, caring and developing the young generation is duty of each family, institution, organization, mosques, religious centers, humanitarian group and the government. Following solutions should help a lot in reducing their frustration:

**Provision of Study Opportunities:** Hundreds of youth face frustration when they want to continue higher studies but they cannot register in local universities due to average or poor marks. They cannot be deputed outside for study due to the same reason. They find the doors of education closed in front of them. Opening new universities and lowering the admission criteria in the existing universities can save these youth from the frustration. Any person who wants to continue his study should be provided an opportunity even if his/her grade is not so high. Education should not be linked to the labor market needs. Education is a tool of personal development.

**Helping in Marriage and Settled life:** Government with the help of charity organizations should work to help youth in getting their lives settled through helping them in getting married. This will enable young generation to be more sincere towards their job and social responsibilities. Government has already been working hard to save them from unemployment.

**Guidance from Mosques:** There is a need to counsel young generation from the dice of mosques. Many of them are ignorant of the goal of life. They are in illusion due to their present life pattern and situation. They don't know the importance of hard work and struggle. They are totally ignorant of facts of life. They think that seeking cheap pleasure and comfort is the goal of life. The issue of youth should be highlighted frequently in the sermon of Friday prayer. They should be lead towards higher goal of life and be explained that a noble life cannot be achieved but by hard work and sincere efforts.

**Accommodating in Military Services:** Accommodation of youth in different sectors of military services may easily solve the problems of thousands of youth. They will no more have free time to drive here and there and cause problems. They can also be offered voluntary military training along with temporary military job.

**Crackdown on Drug Smugglers and Human Traffickers:** Car accidents and drugs have a direct relation. Young generation must be saved from drugs at any cost. All doubtful places or remote rest houses should be kept under close observation by the

security police. All doubtful places should be subject to police raid. Any young treating in abnormal way on the road or public place must be taken under custody. In addition to the road accidents, there are many accidents associated with human traffickers. Youth involvement in such cases are common. Human trafficking also has a link with road accidents. Human trafficking chased by security police ends up in fatal accidents. With the help of high surveillance cameras and powerful radars, this problem can be checked or minimized efficiently.



Figure 7: Spray Diagram showing the main points of managing young generation.

**Construction of Recreation Centers:** There are many more parks and gardens for families and children. However, there is lack of playgrounds for youth. Exclusive football playing grounds should be made in plenty. They can be fenced if required so. They should not be necessarily full length playground. Likewise, public gymnasias (run by public sector) and indoor games centers are also needed for youngsters. With the creation of such centers which are free of fees or with a nominal fees will help a lot in leading young generation towards a positive life.

Four major discussions of solving traffic havoc at KSA that were the outcome of Systems Thinking approach came to an end. The main problem lies in the execution of this approach. Once the Systems Thinking approach and its four parts are applied as discussed above, the problem of traffic havoc will be solved successfully.

**CONCLUSION**

Systems Thinking is a pattern of integration and effective decision making which was introduced as an important tool for strategic planning and decision making. The concept of Systems Thinking having wider boundary than strategic planning, explores all possible reasons, factors and solutions of a complex problem. The applications of Systems Thinking by practitioners, CEOs and policy makers have been limited (Nguyen et al, 2012) due to many reasons, like unawareness of the force and process needed to shift from non-systems thinking set to systems-thinking one. One of the major reasons is difficult to understand it (Herrscher, 1995). This paper has expressed the

importance and widespread potential for utilizing Systems Thinking approach in solving the complex problem of Saudi traffic havoc. The human and economic costs of road accidents calls for swift solution. Let us apply Systems Thinking approach to stop the terrorism on the road.

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