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'In India, the road discipline is very poor'

"In December 2020 more than 25% of our business will be from new products"

IntrCity SmartBus: Next Gen Travel Promise From RailYatri

'In India, the road discipline is very poor'

When it comes to roads in India- Prof. Satish Chandra, Director, CSIR-Central Road Research Institute, is one of the last words and an authority on the subject. Prof. Satish Chandra speaks his mind on a range of issues from good or bad roads, to smart roads that might change the way we travel in future – in an exclusive interview to Bus Coach India. Excerpts from a free-wheeling with Neeraj Mahajan, Resident Editor, Bus Coach India.

Q: Do you agree with the hypothesis that good roads lead to accidents because people tend to drive fast without any fear, while bad roads are safe because people drive slowly and with care?

A: I agree to some extent, particularly when road discipline is very poor and people tend to violate the speed limits on highways. But it does not mean that we should not provide good roads. Bad roads are also equally unsafe particularly for two-wheelers as the motor-cyclists can lose control of the vehicle if road condition is bad. The fuel consumption, vehicular emissions and vehicle maintenance cost are also very high on poorly maintained roads. In fact, the road crash scenario depends on driver behavior to a large extent. A good road is one that is designed for mobility without compromising on the concerns of the local traffic as well as vulnerable road users.

Q: According to safety experts, the risk of dying on Indian roads is 10 times more than in the United States. What are the reasons for this apart from rash and negligent driving, by bus and truck drivers?

A: There are many reasons for that like deficient road geometry especially at intersections, absence of proper enforcement measures like Intelligent Transport systems in the form of Speed

Prof. Satish Chandra, Director, CSIR-Central Road Research Institute

Enforcement systems and Incident Detections system, poor control on overloading of vehicles are few of them. There is a need for installation of alcohol interlocking system in light and heavy motor vehicles to prohibit drunken driving phenomenon. Also, Motor Vehicle Act 2019 should be implemented in true spirit across the country.

Q: "Bad drivers, bad vehicles or bad roads" – which is the worst culprit from the road safety point of view?

A: The order is drivers, road infrastructure and traffic heterogeneity.

Q: It is said that the biggest flaw in the road transport sector in India is that road networks have been developed from the point of view of providing accessibility rather than mobility. As a result, it is extremely difficult to provide all the desired safety features in the existing network.

A: Yes, it is true that the development of Indian road network is happening by providing direct access to lower category roads like MDR, ODR, PMGSY & Village roads with State Highways and National Highways. At such locations, it is essential to provide proper traffic calming measures

conforming to the provisions of relevant Indian Road Congress (IRC) Standards.

Q: Traditionally building and maintaining roads was a low technology area. All it took was - asphalt or concrete which was compacted into a smooth, solid surface and painted to indicate restrictions, routes, and information. That's all. Is it still the same or changed drastically?

A: Things have changed drastically over time. Design methodologies have changed from empirical to semi-mechanistic which are now based on stress and strain criteria. Construction methods have changed from manual or semi-mechanised to fully-mechanised like sensor-based batch mix plants and pavers for higher paving widths and vibratory rollers etc.

Construction of composite pavements, use of modified binders and new maintenance technologies like micro-surfacing, recycling, stone matrix asphalt, use of waste plastic, thin and ultrathin white topping are being encouraged to conserve the materials. In order to save the environment, the emphasis now is on use of warm and cold technologies as and when feasible.

Q: Would you agree with the premise that the main challenge is not to build good roads but to maintain and keep them in a condition that enables all-weather access and regular transport services?

A: Construction and maintenance of roads are equally challenging. Proper maintenance method at the proper time is the key to keep a road in good condition. There are now scientific methods available to decide the type and extent of maintenance required for a road. In order to make use of available resources in technical and rational manner, Pavement Maintenance Management Systems (PMMS) for different categories of roads are also in practice.

Q: Some recent studies have reportedly found a strong correlation between lack of access to basic infrastructure and poverty. Do you support the proposition?

A: We support the above proposition and it is quite evident also in some of the less developed states of the country. The proportion of income spent on transport decreases with increased income. Households belonging to low-income groups usually spend more than 30% of their income on commuting, and the high-income group spends only 10% of their income on their daily commute.

Q: There is a strong belief that air pollution and noise due to traffic jams have an adverse effect on public health. Scientific evidence has confirmed that exposure to traffic noise significantly increases the risk of lifestyle diseases like high blood pressure, or heart attacks. What is your opinion?

A: Very limited studies are the available world over on this issue and therefore understanding of the impact of noise and air pollution from road traffic congestion is limited. CSIR-CRRI have conducted studies on real world emissions and estimation of pollution

loads during congestion, which show the emission of pollutants is high during congestion and during stop and go situations. It can be taken as a suggestive of the potentially significant health risks from congestion depending on the duration of rush hour, type of road, traffic volume and the mix, travel time, meteorological conditions, etc. In my opinion, there is a need for further research on congestion-related health risks, exposure characterization, and epidemiological studies. There is also a need for development of emission models based on representative driving cycle during congestion in Indian context.

Q: Would you like to elaborate on the findings of the CSIR - CRRI study on the impact of regular exposure to traffic-related air pollution on the health of school children? I hear that it has an impact on the respiratory, cardiovascular and neuro-psychological functions, and also adversely impacts their academic performance.

A: CSIR-CRRI have recently undertaken a study on the impact of exposure to traffic-related air pollution on the health of school children in collaboration with International Institute of Health Management and Research and CPCB. Presently the study is in nascent stage, once it is completed the finding can be shared with due permission from all the collaborating partners. Broadly, in this study CRRI will quantify the traffic-related pollution whereas health experts from IIHMR will study the health impacts.

Q: Scientists today are said to be looking for alternative materials – like industrial waste in highway construction because of the belief that it helps kills two birds with one stone – dispose-off waste and reduce pollution. I understand that CRRI has also taken a lead in the use of waste and marginal materials like fly ash, steel plant slags, copper slag, kimberlite tailings, municipal wastes, cinder, and Jarofix for construction of road embankments and pavements. Would you like to comment on that?

A: Due to large scale road infrastructure in the country, there is a gradual depletion and non-availability of natural resources viz. soil and aggregates within an economical lead. The conventional soil and aggregates are extracted from identified soil/rock quarries, resulting in loss of forest lands; creating noise and dust pollution all leading to environmental hazards. Hence there is an urgent need to find new alternative materials for road construction which would not only reduce the total cost of the project but also protect our environment and society.

There are a number of industrial wastes and other marginal materials that have potential for use in Road construction. Fly ash, Copper slag, Jarofix, Zinc slag, Steel slag, Chrome slag, Foundry sand, Phospho-gypsum, Red-mud plus marginal local materials like C&D wastes; Municipal Solid Wastes; Marble dust, Local soft aggregates, etc. to name a few. CSIR –CRRI is carrying out R&D studies on all these waste materials both at laboratory and field implementation level. The experimental test sections are constructed and monitored over a period of time before recommending the same for

large scale field applications. Based on the outcome of these studies, the Indian Roads Congress (IRC) has issued guidelines for use of waste materials. However, their actual use in the field is still very limited, mainly due to lack of awareness and confidence among field engineers. These technologies not only provide alternate solutions to Industries for safe disposal of these wastes but will also conserve conventional materials; control pollution and will reduce the cost of construction.

Q: The world today seems to be headed towards an era of intelligent and safe transportation where roads in the future will have the capacity to detect the direction and speed of the vehicles and suggest less congested and safe routes for drivers in real-time. Such road would also be able to detect accidents and alert emergency services. Are such things really possible?

A: It is very much possible through the implementation of appropriate ITS solutions.

Q: I understand that Smart roads would be able to analyze data about the number of tyres in contact with the surface at any point in time to understand the traffic movement and inform drivers about smarter way ahead. The sensors fitted on these roads could predict bottleneck areas and inform drivers to alter their routes and prevent traffic jams. Would you like to elaborate on this futuristic trend?

A: Not much convinced with the feasibility of the implementation of the above hypothesis. The cost will be too exorbitant to bear for a country like India. There are other methods to achieve the same goals.

Q: They say smart roads will not only keep us safe, regulate the speed of vehicles and implement warning systems, but also transmit real-time data and make it simpler and quicker to get around, find a parking space and commute effectively. No doubt, but are these technologies cost-effective, economically feasible or repay their cost in the long run?

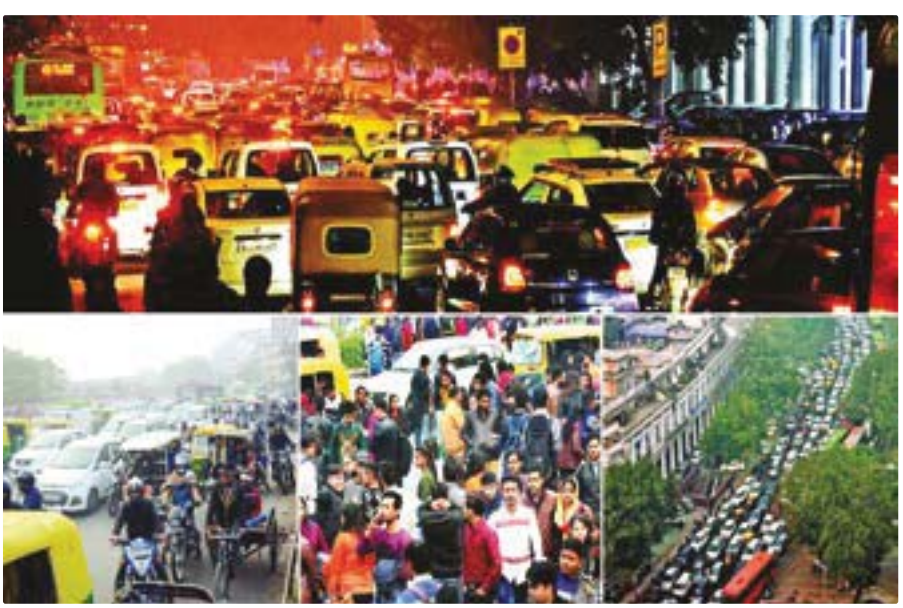
A: This is a futuristic technology for improving the operation of connected and autonomous vehicles (CAVs). In my opinion, India should focus on the implementation of different modules of Intelligent Transportation System (ITS) first, which are more feasible than making smart roads.

Q: China has already taken a lead in this technology and is building a highway in Jinan City 250 miles away from Beijing. The smart-road will have a transparent layer on top to generate solar energy to power street lights and homes on the highway and sensors on the surface which will keep track of movement and provide live traffic updates to connected vehicles, besides charging electric vehicles on the go. How long would it take for such revolutionary changes to become a reality in India?

A: Yes, the concepts are being tested on the ground in some cities of China and some European countries, by laying pilot road stretches. Let us wait and see their success rate and cost-benefit factors. It will take a long time (10 years or maybe more) to adopt these technologies in India.

Q: From solar-powered roads, law enforcement drones to glow-in-the-dark motorways; the way things are happening technology might change our roads in years to come. What is your opinion on that?

A: We have not been able to implement even the conventional ITS covering the arterial road network of the country. In Delhi, two aspects of ITS are being tried on a pilot project basis. These are Red Light Violation System covering more than 45 intersections (out of 890 intersections in the city) and Speed Enforcement System at 100 locations covering only 1400 km of arterial / sub-arterial road network out of 33,000 km available in the city. The technologies mentioned by you are the next generation technologies and will take at least 10 years to come on Indian roads.



Q: Would you like to comment on the development of intelligent transportation systems (ITS) and automated highway systems where specially equipped cars, trucks and buses travel together using electronics, computers, radars and wireless sensor nodes being used in aviation, space travel and defense? Are we too taking a step in this direction?

A: Various state governments are making small baby steps in this direction through the implementation of various ITS pilot projects and hence called as a piecemeal approach. However, this needs proper integration covering the arterial road network of the country with specific focus on metropolitan cities.

Q: Do you agree with the presumption that most road accidents are due to human error, hence the need for a robust automated system for safe and smooth flow of traffic, while reducing fuel consumption and engine wear?

A: Yes, I agree with the above statement.

Q: Do you support the view that next-generation technologies will make a big difference in the manner in which people travel? Technological innovations will change the shape, size, and dimension of vehicles - from headlight to taillight and everything in between – beyond recognition.

A: Transformations and innovations are very much on, which will help in achieving a sea change in the next-generation vehicles. For instance, the following policy decisions taken by the Government of India (GoI) will have huge bearing on the reduction of vehicular based pollution and road safety:Leapfrogging from Bharat Stage-IV to Bharat Stage-VI (BS-VI) manufactured vehicles from 1st April 2020. To augment the share of electrically driven vehicles (by including cars, two-wheelers and bus) to at least 50% by 2030.

To enhance road safety, measures are already taken to introduce High Definition Lamps in Headlights of Passenger Cars and Two Wheelers. All new motorized two-wheelers manufactured after April 2017 are being mandatorily equipped with Automatic Headlamp On (AHO).

Q: They say it takes much less money to fix a good road in need of some maintenance rather than rehabilitating a bad road. What do your opinion about that?

A: Yes, it is correct. There are different types of maintenance methods like preventive maintenance, routine maintenance and periodic maintenance. If right treatment is provided to the right pavement at right time, the life of pavement enhances considerably.

This approach is quite economical also. Delayed maintenance can deteriorate the pavement very fast requiring complete rehabilitation, which is not only expensive but also inconvenient to moving traffic also.

Q: Do you subscribe to the idea that improper drainage and cracks, potholes, shoulders, fissures, potholes, and craters are the worst nightmares for highway engineers and scientists? The intrusion of water into the pavement is the main cause behind most pavement distresses. If water is kept out of the pavement, majority of distresses can be prevented or delayed?

A: Yes. Improper drainage is one of the reasons for road failure which causes cracks, raveling, potholes, etc. and nightmares for highway engineers and road users. If proper drainage and camber are provided to a road, majority of distresses can be prevented or delayed.

Q: Would you like to comment on the utility and benefits of Road Safety Audits? I understand they were not required in India prior to 2014 when MoRTH issued guidelines and SOP for mandatory road safety audits at the design, construction, and operation stage. Are we making full use of the audits for the continuous evaluation and taking corrective steps to keep India's roads safe now and in the future?

A: There are several benefits of road safety audits. Unfortunately, recommendations emanating out of Road Safety Audit (RSA) are not being implemented by various road owning agencies except for the roads taken up for construction under Build Transfer and Operate (BOT) Scheme. All the road owning agencies should be imbibed with the culture to implement the RSA recommendations (covering all stages of RSA) and should be advised to document the benefits in terms of road crash reduction subsequent to the implementation of RSA recommendations for a minimum period 2 to 3 years. ◻

By: Neeraj Mahajan