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# Prof MR Krishnamurthy Memorial Lecture:

Understanding and Harnessing Linkages between  
Sustainable Transport and Livability for Building  
'Brand Bengaluru'



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I am humbled and honored to deliver this lecture in the memory of Prof MR Krishnamurthy. I read through his illustrious profile, long journey, close association with M Visvesvaraya and his contribution to textile engineering and related fields. Overall, he contributed to education and was the principal of Sri Krishnarajendra Silver Jubilee Technological Institute, a very old college in Bangalore. I am also very pleased to meet his family members today. Thanks again to Prof Gopal Naik of the Centre for Public Policy for inviting me. As I was told when I was invited to this lecture, it focuses on the issues of Bangalore. So, I thought, let me try to tailor my lecture to what I can talk about Bangalore. There is mobility – something very close to everyone's heart. How do you also think about larger development goals for the city, which is making the city more doable and improving the quality of life of people through the lens of transport? How can we actually improve the quality of the transport system – make it better, accessible and affordable to everyone? Then it can also be used to improve your quality of life.

So that is how I thought of curating the title of my presentation – *Understanding and Harnessing Linkages between Sustainable Transport and Livability for Building 'Brand Bengaluru'*. First, we would talk about the sustainability of the transport system, and then we will see how to link it to livability. Also, how this can be leveraged to build 'Brand Bengaluru'. This is something all of you are familiar with.

So, how we link all this to 'Brand Bengaluru', is what we are going to see. But first, let us understand what 'Brand Bengaluru' is. What is this initiative?





I will give a brief background about it. As I said, this campaign was started by the Government of Karnataka with the intention of transforming Bengaluru through citizen participation. It envisions a city with excellent infrastructure that promotes a healthier lifestyle and the safety as well as convenience of its residents. These are words of the government, not mine. There are different verticals – one of the verticals is mobility. *Bruhat Bengaluru Mahanagara Palike* (BBMP) was interested basically in collecting the citizens' opinions on multiple aspects for effective urban planning and transport. The survey happened in June 2023, and the feedback/opinions were collected through an online portal.

Thereafter, for each of these verticals, some academic partners were consulted. The Ramaiah Institute of Management and the Indian Institute of Science were entrusted with the responsibility of going through these comments, making some assessments, analyzing the citizens' feedback, and synthesizing what comes out of it. Thereafter, we did a 'Stakeholder Consultation' on August 8, 2023, and then we organized a conclave (breakout sessions with the experts) on October 9, 2023. It was attended by around two thousand people. DK Shivakumar, the Deputy Chief Minister of Karnataka, was also present.

You can see a lot of effort went. We invited experts in automation, and they had some say in this. The derivation was very good. We really synthesized some ways of working and gained insight from them.

Then, we had the 'Brand Bengaluru' conclave, where we had breakout sessions with many experts. After those breakout sessions, the Deputy Chief Minister came up, heard us and gave us very good inputs.

Then, we compiled and submitted the report to the BBMP. What were the main highlights of this report? The first thing you may say, let us add it to the policy. What is the development goal? What should be the daily focus? The synthesis from this whole process was that the goal is to be sustainable and liveable.

To elaborate, 'Brand Bengaluru' should be a globally resonating concept, such as 'Sustainable and Liveable Bengaluru' with clearly defined development goals. We should identify the tangible and intangible qualities, measurable targets and measurement matrices. There has to be a clear understanding of what makes the city sustainable and global. For example, the quality of life needs to be important. So, all of us should understand there is a difference between standard of living and quality of life, although there may be certain overlaps between them.

Bengaluru needs a scientifically developed comprehensive master plan and a mobility plan that is up to date. The Bengaluru Metropolitan Land Transport Authority (BMLTA) needs to be operationalized at the earliest. We hope this will create a better way of finding mobility solutions, but we are still waiting for that. But the projects that have actually come under 'Brand Bengaluru' got coverage in a lot of good newspapers.





A plan was to construct around 100 km of tunnel road as a 'Brand Bengaluru' project. There was also a plan to build double-decker bridges. There is one operational in Bengaluru also.

At this point we were wondering if we were building or destroying 'Brand Bengaluru'. I will present some of my research to understand what these projects have been doing.

Bengaluru and other Indian cities are at present trapped in a 'vicious circle of congestion'. Right from the time we had economic growth since the early 1990s during the PV Narasimha Rao government, we have seen an exponential rise in the income of the middle class. A national manifestation of that was a car – something that was a luxury – for most of the middle class. Today, almost every middle class family owns a car. What happened with this exponential increase in car ownership? The roads suddenly became congested. Everybody could own a car and start using it, but then we realized that we are in a congested situation. We are not able to enjoy that ride in a car as an aspiring middle class citizen. Then what happens? In a democracy, you put pressure on your public representatives, saying, please give us more road capacity. Our families have aspired to own and use a car, now we have got a car, so please give us more road capacity. Democracy, the way it works, is that politicians would like to keep their constituency as intact as possible so that they can get voted back to power. Hence, they will then respond to it, and provide more space. So, what we have seen in the last few decades is the addition of more and more road capacity, widening the roads, constructing flyovers and underpasses – this new concept of signal-free corridors, which are now translated to double-decker, tunnel roads, etc. As soon as you add new road capacity, you are able to travel faster. The movement by car becomes easier and faster. But what it has done to Bengaluru, or any other Indian city, is a huge horizontal spread of our cities – what we call an urban sprawl.

There is an interesting piece of research that says that right from, or before, the automobile era, the amount of time that people used to spend on average in travel has remained constant. It has not changed 1-1.2 hours in a day. So, what has changed over time? We have seen a huge transformation in how people move from the start of the automobile era to today.

We now have much faster ways and modes of travel. So, this whole focus on road infrastructure has only resulted in a huge horizontal expansion of our cities and letting people drive more for the same distances. Now, we are driving more and longer for the same set of purposes.

The number and average length of the trips have increased. There is also an aspect of induced demand. People who were using some other mode earlier, might start using their own car and start using these facilities where we have expanded them. Moreover, we have not reached the saturation levels of car ownership. So, any new road space you add, would only lead to more and more vehicles occupying it in no time.

What is the result of the last few decades of road infrastructure interventions in a city like Bengaluru? We are still among the top five traffic-congested cities in the world. Has it changed our





lives? Has it made things easy for us? But we still want to build more. Even on Bannerghatta Road at one junction, I could see that we have an underpass, then there is a road, and now there is a metro station coming on it. They are already going three levels, four levels, and now we have a concept of double-decker, triple-decker, and so on. There is no end to that quest to accommodate more and more cars into the road space system. But what it is doing is adding more vehicles and congesting the infrastructure back again in no time. And then people keep asking for more space.

When horizontal expansion is limited, you start going vertical, but there is no end to it. Now, how do you come out of this vicious circle of congestion? There are many ways. When you see that people are getting wealthier and can buy a car easily, discourage ownership of a car. Have higher taxes. In some countries, for example, they will charge more than 100% of the cost of the car as a lifetime tax to discourage people from buying a car.

Other countries have found their own ways. China has restricted the number of registrations that they issue every year. Japan asks for proof of a private parking space before they allow people to buy cars. You also need to reduce the usage of a car. That means, how many miles and kilometres you are travelling using cars. If you go to the United States, barring a few cities, you can count on a finger where public transport is reasonable and people use it. In the rest of America, you cannot really move without your car. You come out of your house through your garage, drive for four to five miles even if you have to buy a safety pin, and then come back – that is how it is. So, you also have to bring policies to discourage car usage. How can we do that? The Delhi government tried the odd-even scheme, but nothing works in isolation. You have to complement it with other things, restrict parking spaces in busy areas, or have streets and areas that are restricted to motorized vehicles. If you go to most European countries, you will find that their city centres are all restricted to personal vehicles.

Of course, our infrastructure has not reached saturation levels. So, do not invest in road infrastructure when you are building more infrastructure. Rather, build and provide more supply of public transport systems, increase their accessibility and reach – they should be accessible within a





reasonable distance, provide priority for the movement of these more sustainable modes. Where is the priority or access right away for pedestrians or cyclists to move within the city?

These are the interventions that would help, along with mixed land use strategies. If you can live closer to where you go for work or where you go for education, you can adopt sustainable modes more easily. So, there are several ways in which you can cut out of this vicious circle of congestion.

I was talking about car ownership, which I will discuss further with a graph. On the X-axis, you have the GDP per capita of different countries, and on the Y-axis, you have car ownership per 1,000 population. These sets of flags are of the rich economies like the US, Australia, Japan and Germany, and you have BRIC countries here, including India. So, what has been historically seen with these rich economies is that as they have grown economically on their GDP per capita (the US is currently roughly \$60,000 per capita; India has roughly \$3,000 GDP per capita), when these rich economies have gone through economic growth, they have seen a strong S-curve type of correlation with the cars owned per 1,000 population. And within that S, we have a steep growth period of roughly 2,000 to 5,000 US dollars per capita. So, when these countries have passed through this phase, they have seen a steeper growth in car ownership. India has not even entered this phase in terms of GDP per capita, and it tends to saturate at roughly 600 to 800 cars per 1,000 population. So, the US has around 800 cars per 1,000 population. How much is our country's average in cars per 1,000 population? Hardly 20, 25 cars per 1,000 population. If you think about Bangalore, it is around 200, 250 cars per 1,000 population. So, we are even nowhere closer to the saturation levels. What does this mean? If you supply more, it will get consumed in no time because we have not reached the saturation level, and at the same time, we are growing very fast on this. We are the fastest-growing economy, we are an aspiring economy, aiming to become a developed nation by 2047.

Does that mean that we would like to reach these saturation levels? Can we even afford it? What is the situation now in Bangalore? So that is why these fancy ideas of double-decker and tunnel loads. They will get consumed in no time because this will only encourage more purchases of vehicles, and more miles travelled on them. We will also discuss the side effects of miles travelled more on motorized vehicles. We will also go through some of my research results.

The point is that we cannot, of course, compromise on our economic growth. So, there is no way we will restrict ourselves to this GDP growth just because we want to lower our car ownership. So, the point is, can we decouple our economic growth from car ownership? Why do we include car ownership as part of our standard of living? Decouple car ownership from the standard of living. That is where you would really see a more sustainable and liveable future for our cities, and I will show you the results to explain this. Now, among those rich economies, there are examples of how some countries like Japan have saturated at much lower levels of vehicle travelled, despite having higher levels of car ownership compared to, for example, the US.

These countries provide us with some pathways and examples of what we should really do. But we are just moving towards that American way of infrastructure building. Right from the automobile



era, their whole transportation planning focused on just estimating how many more cars would come in the future and how much more road infrastructure we need. As I said, even now, barring a few of the American cities, everything is completely dependent. So, it is socially imbibed in their culture now having an expression of personal liberty, but that is not the path on which we should go. Now, you may ask me, are you saying people should stop using personal vehicles altogether? Are you saying that the government should not build any more roads? Are you saying we stop using the car and use public transport and active modes like walking and cycling even when the connectivity and service are so poor? At the place where I live, where is the bus coming? It comes after half an hour, plus reaching the bus stop is so difficult. Where is the metro station? Where is the first mile and last mile? We cannot even walk properly. There is no comfort, no convenience in using these modes.

I did not mean it that way. You would also say, why only the rich should use the car? Rather, create a system and empower everyone to use a car. In fact, there was a forum in NIAS, where I delivered a lecture to senior scientists from across the labs in the country, and one of them asked why a car should be accessible only to the rich. She said everybody should be able to use a car. I replied that that would not be sustainable and will not make the city more liveable. I would like to quote the famous former Mayor of Bogota, Colombia, Enrique Penalosa. He said, “An advanced city is not one where even the poor use cars, but rather one where even the rich use public transport.”

The important thing is, I agree that everybody should be able to afford a good standard of living. But please decouple car ownership and car use from that.

Switzerland has roughly \$80,000 per capita as its average income or average GDP per capita. Still, in a city like Zurich, almost 60% of people use public transport, walk and cycle. Their standard of living is way higher than ours or anybody else's. However, people will use sustainable modes, such as public transport, walking and cycling, only when they become an attractive mode option. It is not going to happen because of what I or someone else may recommend. It pure consumer behavior.

To come here, I would have loved to use public transport, but the attractiveness of public transport for me to travel here is much lesser as compared to taking a cab or driving. Building more tunnel roads or double-decker or signal-free corridors will not make public transport attractive. In fact, tunnel roads will not be used by public transport. Do you think buses will use it? Where will I have a bus stop and tunnel? They will drop you in the tunnel, and then where would you go? So, it will become an exclusive space for VIPs and car owners. They will also debar the sense that it will be on PPP. There will be more accidents because of our mixed traffic behavior. So, they will also debar and ban two-wheelers from it, which is exactly what has been done on the Bangalore-Mysore expressway. The point is that mobility is not a buffet meal, which keeps everybody happy.

So, this double-decker, for example, is a good example of what we are trying to do. We are trying to offer a buffet meal. We are trying to provide space for public transport on one deck and another for personal vehicles. But I keep saying that this kind of buffet offer is actually a death knell for public





transport. For this simple reason, how will you make public transport attractive? If you have an origin-destination between two points, a and b, you are travelling, and have an in-between this double-decker. If you use your car, you will take the one deck and go straight without stopping. If you use a metro, you will first have a first mile and last mile, depending upon what more choices you have. You will have some transfer, with difficulties, like climbing the roads and crossing, etc.

Then, you'll get into the metro, but it will stop at every station for passengers to board and alight. So, your total travel time between the same two points would always be much higher by metro than by a personal car. If anybody has a choice of using their personal vehicle versus the metro, why would they use it? Especially for commuting trips with a high time value, where you like to reach your destination in time.

This idea is a death knell for public transport. From a civil engineering angle, raising a pillar and having multiple decks sounds perfect. We are not raising different pillars and different decks. We are consuming less space. But from a transportation systems engineering perspective, it is a horrible idea. So, it is not a buffet meal, please keep that in mind. It is about reaching an equilibrium when it comes to mobility, or in other words, an optimum where everyone's travel needs are satisfied with a reasonable level of service. We also have a balance of trip mode share that enables sustainable mobility and liveable cities.

I am not saying that nobody should use cars and cars should be completely banned. But we need to reach an equilibrium where everybody's travel needs are satisfied with a reasonable level of service. Still, you attain an optimum share of how many trips are taken by different modes. And where will that equilibrium come from based on all the research we have done? We need at least 80% of daily trips on public transport, walking and cycling for the city to become sustainable and liveable, for a sustainable mobility system. This is where the equilibrium lies.

What is this attractiveness we are talking about? Technically, if you think about your origin and destination, the public transport trip would have multiple legs. You will have a first mile: walk, cycle, your two-wheeler, automobile, car, taxi, etc. Then you will transfer to a public transport mode, a bus or a metro. You might also have exchanges or transfers between them. For example, you are





taking one bus route; you go and change it at Majestic station, then take another bus route, and then reach the final destination. Or you take a bus, then go to the metro station, and then take a metro. Or you take a metro, then change from the majestic station, from green line to purple line, or vice versa. And then, again, as you get down near your destination, you have a last mile to reach your final destination, which could be any mode. So, for you as a user and as a commuter, your interest is in this complete journey. What is that seamless experience, a given mode can give me?

What is the utility that I have derived from using the public transport mode versus the utility that I will have from using my personal transport? If this gives me better utility, then I will use it, otherwise, I will not. For example, at MG Road, there is a new station coming up for another line. You might have noticed there is a lot of digging that is happening. You currently have an existing metro station, MG Road metro station, which is above ground, elevated, and there is something that is coming underground. So, you already have three levels of difference. And in the future, there could be huge effort, energy, time and difficulty that could be involved in the transfer even within the lines.

Why are we not able to do this integration itself when it is under one agency? Forget about the integration among other modes. An operator may see it differently. Build the station wherever you find land. This has been the approach and thought process of the Metro Rail Corporation or any public transport operator. But we need to focus on optimizing the complete journey, origin to destination, including optimizing every leg of the journey, whether it is waiting or transfer. Everything is a cost to a user, you monetize it. We call it a concept of generalized cost or utility.

So mathematically, what we do is, we use this discreet choice modelling to understand the attractiveness among different modes. There is this kind of utility equation for each mode option. So, if it is a car, two-wheeler, public transport, or walking cycle, each one will have a utility equation. There will be certain attributes or variables, whether it is time, travel time, in-vehicle travel time, transfer time, waiting time, walking time, travel cost, comfort, etc., and even social, demographic parameters. Gender, income group, etc., all that together make utility for each mode. It works by allowing you to choose a mode that gives you maximum utility. This theory was developed by UC Berkeley's Prof Daniel McFadden, who eventually got a Nobel prize in Economics. Hence, I choose a specific mode only when its utility is more than the utility of others. You may have different mode alternatives, and you will have this kind of probability function, which is directly a function of the utility. So, if you have a double-decker, your utility of using a personal car or two-wheeler would always be high because the travel time is less. The other components of this utility are more attractive. And your public transport utility would go down further.

When it comes to transportation systems engineering, offering a buffet meal is a bad idea. The idea reflects lack of understanding of systems. Transportation planning should be about reducing or removing congestion points. So, the whole focus of transportation planning has been now totally top down. You identify the congestion spots, and we use a simple ratio called the v/c ratio, volume to capacity ratio. So, you would identify how much volume is there on each road per unit of time and





the capacity expressed per unit of time. If the volume is reaching closer to capacity, those are congestion points. There could be suggestions to widen the road, by constructing an additional flyover or an underpass, which can add more capacity and thereby reduce this ratio.

The whole idea of transportation planning is to reduce this v/c ratio, but it all leads us into that vicious circle of congestion, an unsustainable and unliveable city. We are rather focusing on reducing the total vehicle kilometres travelled by all motorized modes and reducing our dependence on fossil fuels, which should make the city more liveable. The top need is to focus on person capacity, not vehicle capacity. So, when you start expanding the roads, you are just trying to accommodate more vehicles. Rather, you should focus on how much a person or goods per hour per direction, can travel. The person's capacity, and not the vehicle's capacity, is important to focus on.

A strong systems approach to develop mitigation strategies is needed, and we should not just solve the core transportation problem, but also look at those development goals and the mitigation potential. The fundamental strategy of transportation planning should be to reduce the number of motorized vehicles, reduce the number of kilometres travelled by these motorized vehicles, and also fix our energy mix of transport to renewable.

These are the three fundamental things on which the system would work. These are the nine core principles I have listed, which basically define the agenda for sustainable mobility. These are:

- Reduce the need to travel
- Reduce the distance for travel
- Ensure equal access to all
- Infuse more infrastructure for sustainable modes
- Assign the correct moment of priority and right-of-way allocation







- Ensure a seamless and safe experience with these sustainable modes and incentivize its higher usage
- Discourage all types of high polluting and high space occupying vehicles per person they carry
- Promote cleaner vehicle technology – move towards renewable
- Improve disaster resilience of the transportation system

These are the nine core principles that really define the future of mobility. These questions are a simpler way to ask for those nine principles. How much capacity are you adding per unit of investment made? So, when you are proposing a tunnel road or you are proposing a flyover, how much of a person's capacity you are adding per unit of investment? How much of a person's capacity will you add for any extra road space you are creating? But what amount of fossil fuel consumption will change? If it is going to increase, why are you doing that? We are not an oil-producing country. Seventy to eighty per cent of our oil consumption is met through imports. How can you make our economy more dependent on fossil fuels? And that too in today's environment, when there is so much vulnerability with all these wars, oil supplies, etc. By what amount will the tailpipe emissions change? If you are increasing it, why are you doing it? And by how much will road fatalities change? If they are going to increase again, why are you doing it?

You should not do that. So, the point is that you need a bundle of strategies, a mix of planning, regulatory and economic instruments. For example, you increase the network coverage of public transport, improve the cycling and walking infrastructure, and create car-restricted roads and zones. Encourage high occupancy of vehicles and more shared mobility. Have mixed land use strategies so people live closer to where they work. And, of course, moving towards renewable. Buses and cars run on electricity or other renewable energy sources. And, yes, learning from COVID, policies that can reduce the need to travel, the distances to travel, and so on. We have learned how to reduce the need to travel during COVID. If I think about mobility and ask what we learned from COVID, I would say nothing. We have made our cities worse after COVID, after we returned.

Now, let me quickly run through some of the research that we have done. First is the tunnel road versus the underground metro. I keep saying that if you are building the tunnel, you better build it as an underground metro. It will provide 40 times more capacity.

In fact, a road tunnel costs more than a rail tunnel. The simple reason is that rail runs on a fixed right of way. You do not need a big moving space, whereas vehicles run on a flexible right of way. So that is the scale of difference of capacity. Now, if you look at the sustainability angle – what we did was – we tried simulating earlier that there was this tunnel road being proposed on the same corridors where this elevated corridor was proposed. So, we used that as the scenario and tried assessing three scenarios. The first was business as usual, the other was where a tunnel road was constructed on that 92 km corridor, and the third was where an underground metro was going instead of a road tunnel. Then, we analyzed it for the base year and forecasted it for 2030 using our micro-simulation models and city-scale microsimulation models. We also created scenarios for the mix of renewable and non-renewable electricity.



Because a large share of electricity is currently non-renewable, you still have emissions attributed to it wherever they are consumed. The metro is also polluting as long as it runs on electricity, which is coming from non-renewable sources. You also have to apportion that to the corresponding mode.

We used four scenarios – 7426: 74 non-renewable, 26 renewable. The second scenario is 100% non-renewable, and the other scenario is 100% renewable, so these two make the two extremes 50-50. Fifty renewable, 50 non-renewable. So, doing all these combinations.

The emissions are increasing. Same situation you would see in 2030.

You are not decongesting. You are increasing V K T. I did not show the other results, such as how the energy consumption will change and increase for our tunnels, and you would also increase the emissions, whereas, in the metro tunnel scenario, they are all decreasing substantially. So, how can you justify taking the sustainability parameters?

Then, we tried to do another set of research, using two scenarios. One is full if you have seen the comprehensive multi-plan of BMRCL, it envisages a 317 km metro rail network. We take another scenario in the same CMP where they are proposing around 145-149 km of bus priority corridors where NMT improvements will also happen – walking and cycling. We took three scenarios again – the business as usual in 2031, metro scenario and this bus priority and active mode scenario. The amount of travel time, the vehicles that will travel. Again, you will see a lot of savings. If you have a complete 317 km, you would see a 26% decrease in the total system travel time. Likewise, CO<sub>2</sub> emissions and PM<sub>2.5</sub> emissions, you would see a substantial decrease compared to business as usual. Even if we modelled the traffic deaths, you would see an 18% decrease in traffic deaths with the metro scenario and, likewise, 17% when it is the BRTS scenario.





We also modelled the physical benefits based on the increase in walking and cycling mode share; how much is that physical benefit?

We have looked at sustainability. What about quality of life? What about livability? That's also what we have to see. We have seen our vision as a sustainable and liveable Bangalore. We have developed this framework to develop a unique transport quality of life index, and I will quickly run through some of the results.

The first is the quality of life. It is an individual subjective evaluation of their life's condition based on their goals, expectations, standards and concerns, and quality of life is a multi-dimensional concept. You can also call it well-being, happiness, life satisfaction, and so on. There are both subjective and objective ways of assessing it. Traditionally, two terms have been used: livability and quality of life.

QoL is considered a more subjective and perception-based term, and livability is considered a more objective environmental condition. But more and more, research studies are bringing both of them together, into one framework.

There could be several dimensions of quality of life, including transportation, whereas transportation itself has a huge impact on quality of life. So, we are trying to see how transport impacts and improves the quality of life.

With these linkages, you can think about several research questions.

- How will sustainable transport interventions affect physical, mental, economic and social well-being?
- How will it make society healthier and happier? How would sustainable transport interventions affect the quality of life? How would they improve equity, social justice, and so on?
- How will it impact the safety, accessibility, affordability and environmental quality?
- How can it contribute towards things like improving disaster resilience?

We need to answer many interesting and pertinent research questions more and more, and we are also trying in some ways to answer this.

We have developed this framework linking the different dimensions of transport and mobility from a different angle; mobility, accessibility, environmental quality and health, to understand their impact on social well-being, mental, physical and economic well-being, thereby understanding the impact on quality of life. We have developed and identified dimensions and indicators of how we can assess quality of life. And these indicators are estimated, they are normalized. We are using a lot





of background modelling and microsimulation models, and we are also estimating weights using a fuzzy HP method. We determine these sub-indexes, aggregate them using weights, and then calculate the composite transport quality of life index, classify it into good impact to bad impact and so on, and then use it to analyze the scenarios.

But all these research outputs and scientific evidence may be defeated in the face of political economy, business economy and corruption.

How do we decouple political economy from urban transport projects? Especially road infrastructure projects, so that we can achieve a sustainable and liveable Bangalore – this may be a good research problem for the Centre for Public Policy.

I am still not able to find an answer to this research question. A word of caution too. Mobility looks very simple to tackle. Every road user has an opinion, but it is a complex issue.

I will end with just two initiatives related to this. One is the journal I started last year, *Sustainable Transport and Livability*. It is published by Taylor and Francis. We are trying to build more and more evidence, case studies and better methodologies to understand these linkages and help make everybody aware, influence decisions, and so on. The first issue is already out. You can go through it – it is an open-access journal.

The other is that I am organizing a world symposium on System Transport and Livability from June 25 to 27, 2025. It will be at the IISc campus, and this will become a symposium going around the world, once every two years. We want to build a community of researchers and practitioners from across the world who can share knowledge and evidence of how to make our cities and regions more liveable and sustainable. This would be jointly organized with the WCTRS Society, and I am the Chair of this committee, and also the Indian Institute of Science's Department of Civil Engineering. We are celebrating 75 years, so it becomes part of that activity. So, with this, I have reached the end my presentation. Again, I want to emphasize that 'Brand Bengaluru' should be, in a real sense, sustainable and liveable Bengaluru.



## About the Speaker:



Prof Ashish Verma has been the Convenor of the IISc Sustainable Transportation Lab (IST Lab) for more than 15 years. He earned his PhD from IIT Bombay and is currently serving as a Professor of Transportation Systems Engineering at the Department of Civil Engineering, Indian Institute of Science (IISc), Bangalore.

His research interests are in sustainable transportation planning and policy; integrated public transport planning and management; non-motorized transport (NMT); transport and Livability/Quality of Life (QoL); transport and climate change; disaster resilient transport; modeling, optimization and simulation of transportation systems; travel behavior analysis and modeling; pedestrian and crowd flow modeling; driver behavior and road safety; intelligent transportation system (ITS); traffic control and management, etc.

Prof Ashish Verma has authored more than 280 research publications, including over 110 journal publications, in the area of transportation systems engineering. He also has a patent and a software copyright to his credit.

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