Introduction to Multimodal Urban Transportation System

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Lecture-21
Non-motorized Transportation (NMT) Planning: Introduction to NMT Systems

Hello friends, welcome to the next module in our course. This module is titled, non-motorized transportation planning. And this is the first lecture of this module where we will be introducing all the basics about non-motorized transportation systems.

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The concepts that will be covered in this module are the definition and need for non-motorized transportation, their benefits, issues, different types and the comparison between the non-motorized transportation systems as well as the overall planning process that is involved in planning of non-motorized transportation.

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So, let us begin. There is no said definition in the arena of non-motorized transportation but when we talk about it we either refer to it as active transportation or non-motorized transportation. It is said to be a concept which prioritizes planning operations and maintenance of walking and cycling over automobiles. So, anything that prioritizes walking and bicycling over motorized modes of transportation can be grouped as non-motorized transportation. In other terms, if it is powered by humans rather than any form of energy, such as fossil fuel etc., it may be termed as active transportation or non- motorized transportation.

In India, you would see a lot of non-motorized transportation on the streets, which includes cycle rickshaws, hand carts, vending carts, handicap tricycles, bullock carts etc. So, all of this may seem as an informal mode of transportation, but they all form together what is called *non-motorized transportation* and there is growing a need and demand for planning these modes into the formal transportation sector modes.

So, if anybody asks you for a definition, you should be saying that any system or any concept that prioritizes planning, operations and maintenance of walking and cycling over automobiles. So, that is the concept of non-motorized transportation or the definition of it.

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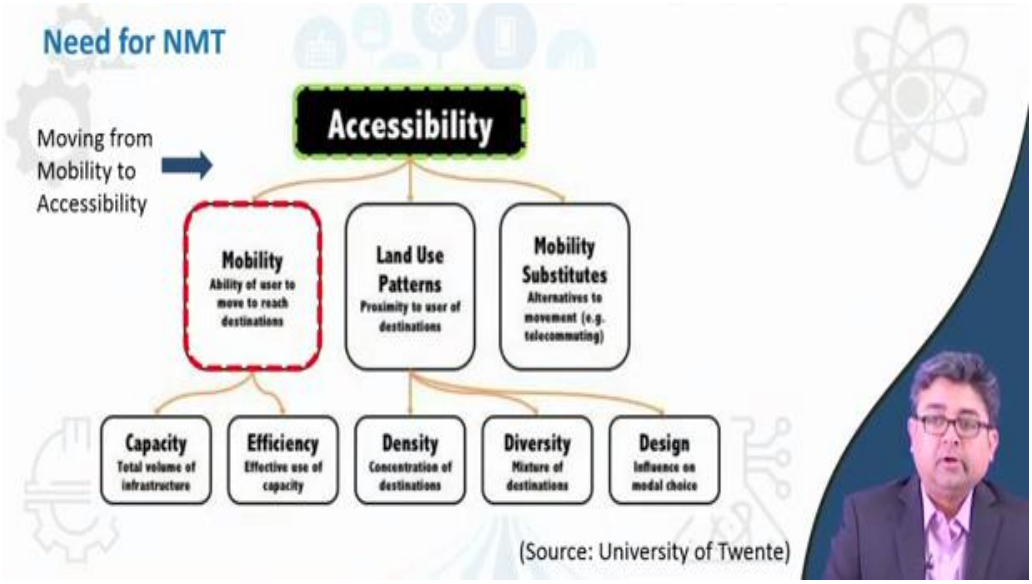

Now, why do we need non-motorized transportation? So, if you look at transportation in general, if you ask any transportation professional, they would say that transportation adheres to the concept of mobility, "moving people" or "moving vehicles" from point A to point B. Whereas slowly what we are noticing is that mobility is not something that is the end-all in transportation. Rather than only looking at mobility, we have to look at the concept of accessibility, because when we are moving from point A to point B, we also want to access those destinations. So, how good is the access to these points? When we look at it from the point of view of accessibility that is when non-motorized transportation modes, their role becomes more and more prominent. So, if you look at the chart, you will see mobility actually falls within this concept of accessibility.

So, initially we were only looking at motorized transport, and so we missed out on these other two aspects of land use and mobility substitutes, whereas, we only look at mobility itself, which if you look at other transportation, motorized transportation modes, they are always dealing with capacity and efficiency. Whereas, if you start looking at accessibility, then you will see that land use starts to play an important role and so does mobility substitutes such as telecommuting. There are many offices which allows you to work from home, and that is called telecommuting. So, all of these play a very important role when it comes to non-motorised transportation. Hence, a need to go back to accessibility and go back to the concept of non-motorized transportation modes.

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This is a very powerful picture which is often shown when the need of non-motorized transportation or public transportation is to be conveyed to laymen or to even the public officials. So, if you see the rightmost picture, what you will see is 40 people in a bus. So, what you can see is that the space taken up by 40 people who are sitting in one bus is very little when compared to the same 40 people who are sitting in an individual car. This concept of moving people rather than vehicles is very essential in non-motorised transportation, or even in public transportation but we are talking in non-motorised transportation terms currently. What this picture conveys is that if you are only worried about motorised transportation, you take up a lot of space on the streets. When you take up a lot of space, this eventually leads to congestion. You know our urban roads are very congested during morning peak evening peak and also sometimes during the afternoons on weekends. So, congestion leads to delay in travel time, congestion leads to environmental pollution. So, if we move those same 40 people by bicycles or even if those 40 people are just walking to their destination, then the space taken up on the street is very little and hence the congestion is lower. If you walk or bicycle, there is almost practically no emissions that is involved. So this is a very powerful picture that is portrayed anywhere to the public officials or in meetings when people are asking for newer non-motorized transportation system. So this is the concept of moving people rather than moving vehicles.

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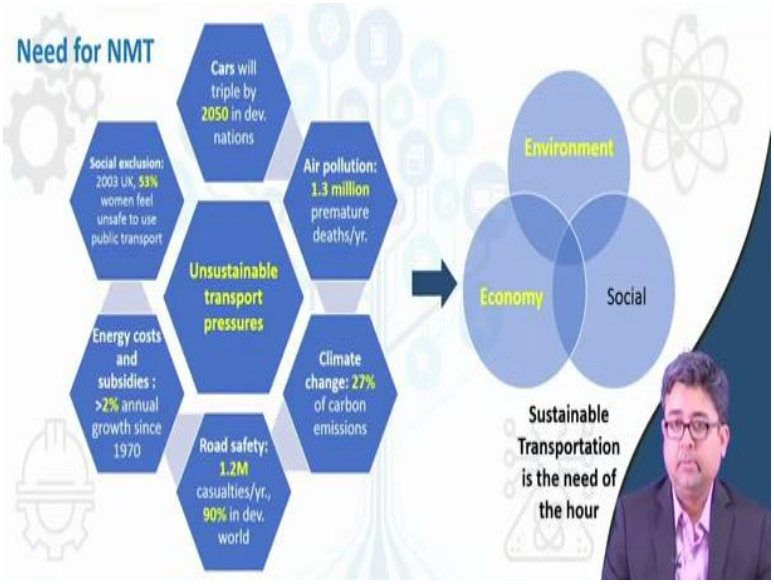

Secondly, you would also see that there are a lot of unsustainable transportation practices that are growing currently in our society. Air pollution leads to a lot of deaths. Climate change is a reality where there is a lot of emissions that are coming out of motorised transportation modes, safety is another concern. In India, safety is a growing concern. As we build newer and newer roads, the safety concern is also growing. When it comes to energy costs, constructing kilometers of roads takes a lot of fuel, so it is not only the fuel that is consumed by motorised vehicles, but just to build these transportation systems or these roads, there is a lot of energy required or fuel consumed. Also, the concept of exclusion—who are we building these transportation systems for? Many of times we see that women do not feel safe in our public transportation systems. The lower income groups are often excluded from our transportation planning, systems planning. For example, even the metro which are considered mass transportation systems, the lower income groups often do not avail of metro systems because they feel it is not for them. So, there is always a social exclusion in the transportation systems. All these elements together, make the current urban transportation scenario very unsustainable. Hence prioritizing non-motorised modes of transport actually helps make this transportation system sustainable. And the three pillars in doing that are environmental sustainability, economic sustainability and social sustainability. So when we are talking about non-motorised modes of transportation, we are talking about sustainable transportation modes and by talking about sustainable transportation

modes, we are talking about combining these three groups, environmental sustainability, economic sustainability and social sustainability.

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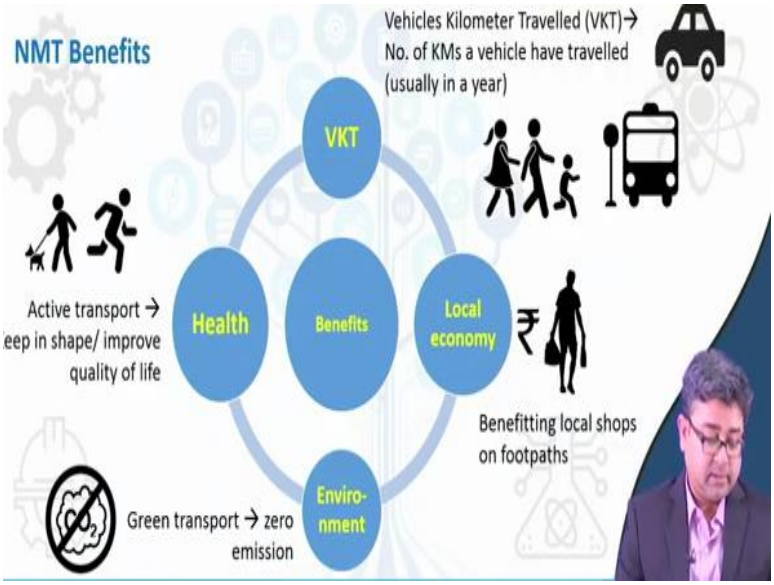

Moving on, when we look at the benefits of non-motorised transportation modes, you can broadly think of it in 4 different categories→benefits of vehicle kilometers of travel (or what we call as VKT), benefits in local economy, benefits in the environment, we have mainly touched upon, and health benefits. So when we talk about benefits in vehicle kilometers of travel it is something that if you own a vehicle, and you drive it 10 kilometers a day, so your personal vehicle kilometers of travel is 10. So if you then just multiply it by the number of people living in your area or university, then you can understand how many kilometers of travel is there per city. What happens by these kilometers of travel is that you are consuming fuel, you are consuming gas or petrol or diesel. Some of the vehicles are CNG, but not many of them are CNG in India and electric vehicles are just starting out. So as a result of these vehicle kilometers of travel, you are also emitting a lot of emissions. Maybe you are involved in accidents, so there is a risk of accidents, risk of death. All of these are creating a problem when you travel on vehicles. If you are cutting down your vehicle travel and increasing your non-motorised travel, your VKT automatically reduces.

The second benefits that have often been neglected mostly in many of the non-motorised transportation system benefits when they are listed out, is actually the benefits for local economy. What we mean by benefits local economy is—it has been found that when you have

these neighborhood shops (the small shops in your neighborhoods, they are not the big grocery stores), people often go to these shops either by walking to the shops, or on a bicycle, sometimes they go on cyclic rickshaw, which are there in many of our cities. So, what happens is these local shops benefit by people accessing them through non-motorised transportation modes. If you have good accessibility to these shops, i.e. good sidewalk connections, good bicycle parking availability, good cycle rickshaw stands that are accessible to the market areas, the local economy also benefits. Whereas the big stores/supermarkets often are farther away from your location, they are only in one or two locations in the cities and you only have to travel to them using some kind of motorised modes. When we say benefits local economy, we mean the small shops in your neighborhood that you often access by non-motorised modes.

Environmental benefits, we have already touched upon it, if you shift to non-motorised modes of transport, you hardly have any emissions or carbon footprint and that is currently a big issue in the sustainability of transportation systems in India. As we are getting more and more wealthy we are buying more and more cars and that are emitting more and more greenhouse gases and polluting the environment.

And the final thing which is a very big benefit of non-motorised transport and we often do is run or exercise for health reasons, but now, it is also being noticed that if you actually walk to your work, or you actually walk for a purpose, or not just for the sake of exercise, but if you walk for a purpose. So, for example, a purpose would be to go and buy some groceries from the local market. So, rather than taking out your two wheeler or your car, if you walk to that place, you are actually improving your health. So there are quantified research that is ongoing and has proven that if you actually substitute some of these shorter trips to non-motorised trips, you are actually benefiting your health. So, overall four different benefits, reduction in VKT, improvement in local economy, improvement in the environment and health benefits.

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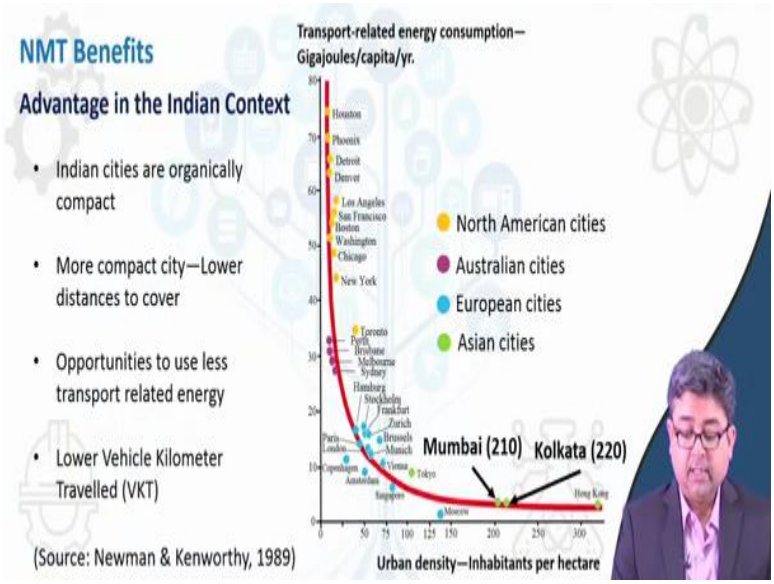

Now, what advantages do we have in the Indian context when it comes to non-motorised transportation? So this is another chart that is often shown, which has urban density on the X-axis and transport related energy consumption on the Y-axis. It plots different cities across different continents as per their inhabitants per hectare. So if your population density is high, if you are on the right hand side of the x axis, then your transport related energy consumption is less. So what it says is if it as a, compact city, if is a dense city, if it is a highly populated, the population density is very high, what happens is the land uses are very close to each other possibly, and you are not traveling so much on motorized modes. Maybe you are using non-motorised modes because the distances are short and thus, your transport related energy consumption is low. Whereas as you move left on the X-axis and your population density decreases, so it is a sparse city, it is a more spread out city, then your transport related energy consumption goes up. If you overlay Indian cities, like Mumbai and Kolkata then you will see that since they have very high population density our transportation related emissions or energy consumption should be very low. But what is happening is, as you very well know, many of our large metropolitan cities are now growing horizontally as well. So, as they grow horizontally, they are becoming outskirts of the cities that are less dense. So as the density decreases, what happens there is your transportation related energy consumption grows. So we have to be very careful when our city grows, so that we have good growth boundaries which do not allow a lot of transport related energy consumption and our land uses should remain very compact. Therefore

we have inherent advantage in our cities, which are slowly decaying, but if we take the right steps, we will not lose that advantage.

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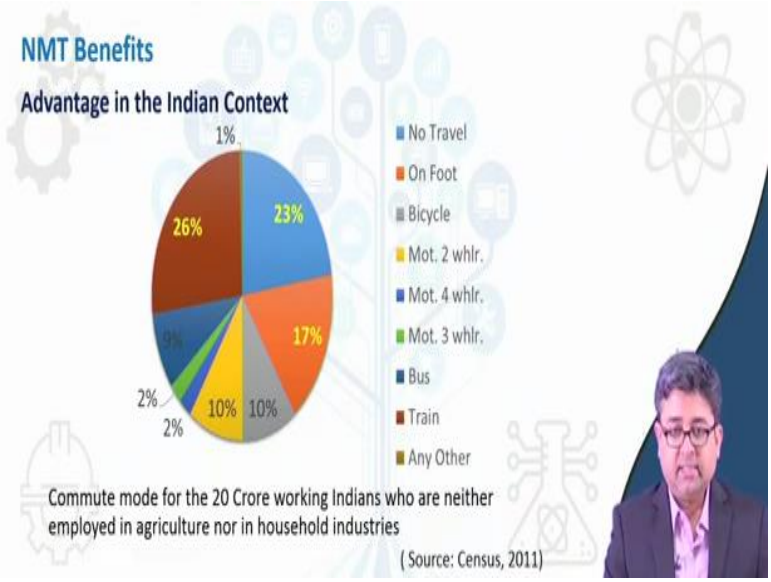

The second advantage in our Indian context is that we Indians, walk a lot and use a lot of non-motorised modes of transport such as bicycles and cycle rickshaws. If you look at this chart, you will see that it is almost 17% on foot and 10% bicycle. This is as per census 2011. No travel would indicate that maybe the person is telecommuting. So that is also saving a lot of consumption, decreasing a lot of transport related energy consumption and reducing emissions. So, that is there is an inherent advantage in our cities as well. We are mostly compact and dense cities.

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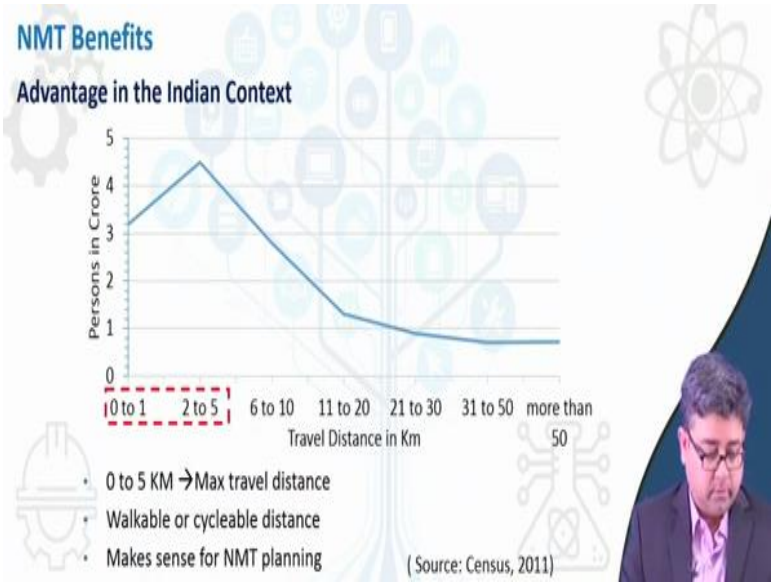

This is in continuation of the previous slide as well, we see that, when we talk about non-motorised modes of transport, usually what we see is that people mostly traveled within five kilometers, when it comes to non-motorised travel. Walking is mostly bound to within a kilometer or so, whereas, if you look at bicycling distances on average they are capped off at five kilometers. As the distance of travel increases, the share of non-motorised mode of transport decreases. So, the farther you live from another land use (your house is a land use whereas your office is another land use) then it is more probable that you will be using a motorised mode of travel. Whereas, if you live closer to your office, the probability is higher that you may use a non-motorised mode or a public transportation mode for that.

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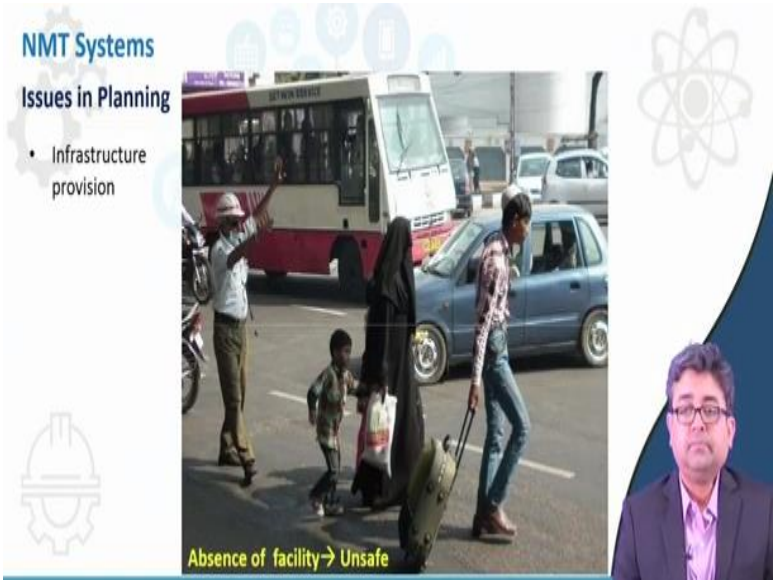

So, now, let us look into some of the issues of non-motorised transportation in India. This is a very common sight in any of the Indian cities where you may be residing. First of all the availability of facilities are not very much in very many of the cities especially when it comes to tier two and tier three cities. We would see that there are nonexistent facilities for example, in this picture, there does not seem to be zebra crossing available. So people unsafely cross the road.

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Whereas in this picture you may see that there is footpath available but the footpath is not complete. As a result maybe people are walking on the road itself and not using the footpath. So,

even the availability of facilities does not always mean that people are using those facilities. Maybe the facilities are not built up to standards or not comfortable enough and therefore people are not using those facilities.

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The next thing is encroachment in our Indian cities. We often hate such kind of encroachments, but we have to also on the other hand think about their livelihood. So, if we say that we remove the hawkers from the streets, the hawkers always resist that move because they feel that they have direct access to people who are traveling on the roads and by having direct access their income increases. So how do we actually solve this situation? Do we remove them from the footpaths and improve our non-motorised transportation facilities? Or do we incorporate the vendors and then try to plan along with them taking them into confidence during the planning process of non-motorised transportation that is something we will also be dealing with later.

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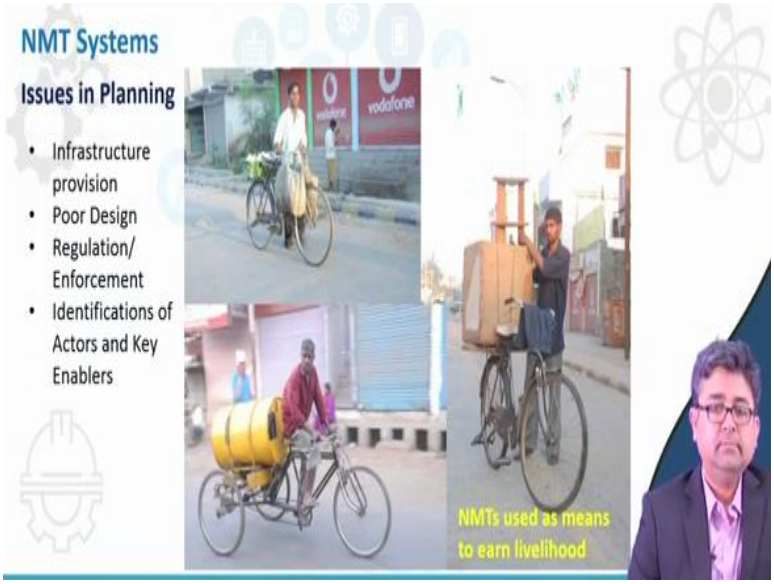

The other thing is, we often neglect who are the users of non-motorized transportation modes. So, non-motorized transportation, especially in this case or in this picture is of what we are depicting is Bicycle Transportation. Now, bicycle is not only used for leisure trips, but they are almost used in many cases for livelihood. You would see a lot of tri cycles or bicycles where vendors sell their items, they come door to door for vending. We have to take into account such kind of livelihood based on non-motorized transportation and also plan accordingly. This is sometimes neglected in our planning process.

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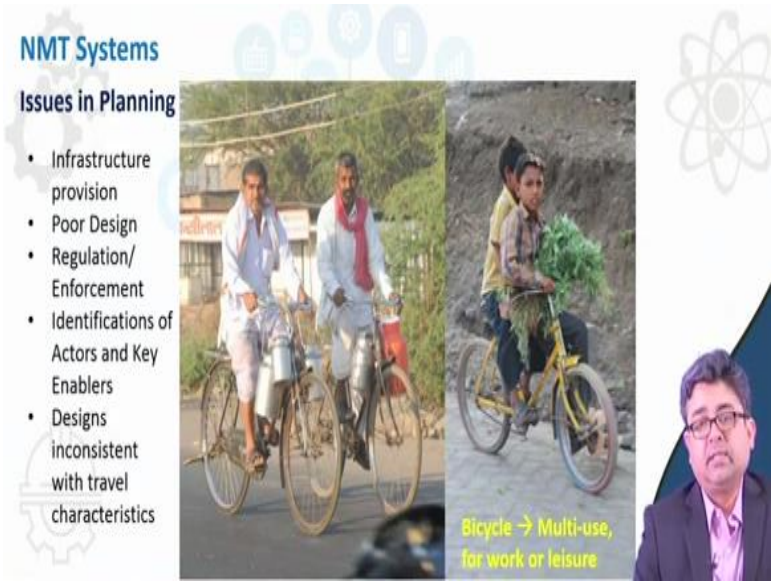

This one also shows that we do not plan for the types of facilities when it comes to non-motorised transportation. Should we allow bicycles on the right of way where there are vehicles or should we have separate facilities for bicycles? This is a big issue. Some of the cities in India are also now looking at providing separate bicycle tracks. But does that provision of the track itself means that lots of bicycle users would use it or do the bicycle users prefer to ride on the right of way itself. So this is something that has to be looked at and probably is not being paid much attention.

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And then when it comes to the types of users, so we always have to be very careful as to there are there may be different types of users when it comes to planning for non-motorised transportation modes. Types of different users meaning not only women, but there may be smaller children, because mothers who may be taking toddlers on along with them for a walk, there may be wheelchair access who may need specialized non-motorised transportation facilities. So, who are the users of these facilities? We have to keep in mind while planning for NMT system.

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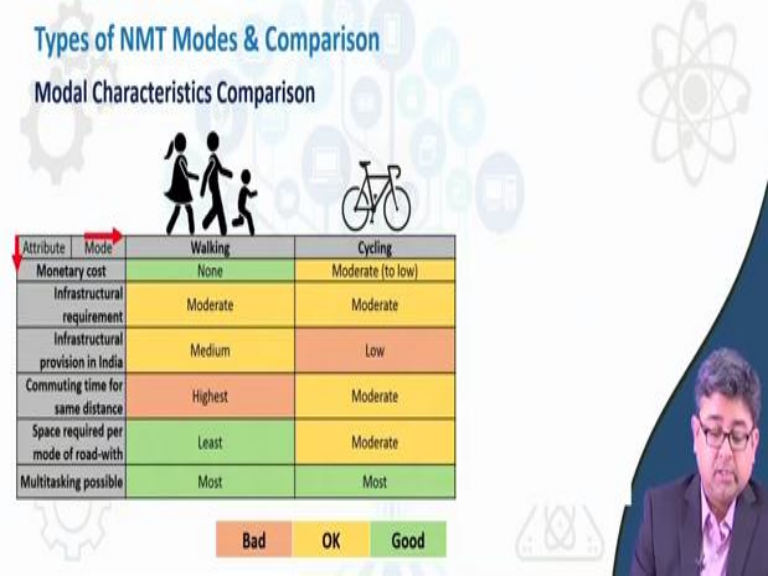

If we look at the two predominant types of non-motorised systems, breaking it down into walking and bicycling. Bicycling may also include your cycle rickshaws or other cycle related modes, you would see that monetary cost wise walking does not cost you anything whereas cycling may cost you very moderate to low cost. Infrastructure requirement is not very high. In India—bicycle infrastructure provision is very low. So, you would see this kind of gives you a comparison against different kinds of attributes and how they are performing against each of these modes.

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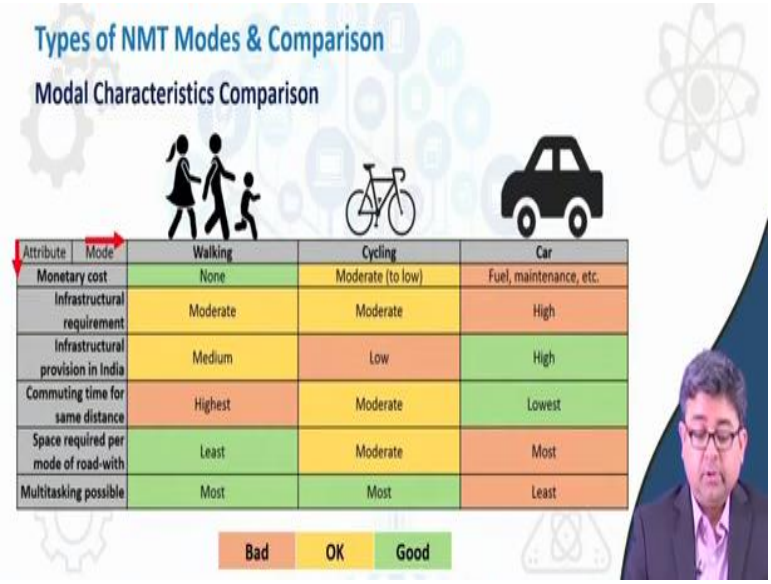

Now, if you then compare it to the car mode, you would see that the car infrastructure provision is very high and the commuting time for the same distance is low. So, a lot of planning goes on

in car transportation plan or automobile transportation planning, whereas, there are a lot of benefits to non-motorised transportation but when it comes to planning for them, we do not plan for them in a good manner.

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Finally, let us look at let us broadly look at what are the steps, it is broken down into these 5 broad steps when it comes to non-motorised transportation planning and today we are just going to give you outline of these 5 steps. In the subsequent lectures we will go into much more detail into each of them. The first step talks about assessing the situation. The second step talks about enabling, third is planning and design, then comes investing and finally it comes to implementation.

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So, by assessing what we mean is that you have to review the situation of your city. So, every city is different from each other. One city may require a lot of sidewalks, whereas the other city may require may already have sidewalks but their crosswalks may not be good. One city may be they have a lot of access issues, so they may be sprawled out. Thus, every city should have their own plan. So there is no one-size-fits-all kind of a situation when it comes to non-motorised planning.

Secondly, you have to enable. There has to be somebody in the city who is a champion or who wants non-motorised transportation planning, unless you have somebody who is championing the cause, it is very difficult to push for not only non-motorised transportation but anything. So, you always need somebody who wants to lead this effort in your city.

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Thirdly, you have to plan and design for these facilities very carefully. It is always best to have some pilot projects done in your cities and then assess the benefits or even the negative sides of it and then go for a larger scale project. So whenever it comes to putting in a new foot-over-bridge we would not advise you to go out and put it in all intersections. So, you have to assess carefully which of the intersections may need it, which may not need it, what are the benefits and then go ahead and plan and design.

Next comes investment. Although the non-motorised systems do not need a lot of funding to be invested, but funding comes very rarely for case of non-motorised transportation systems because mostly funding goes towards large motorised transportation projects. So, when it comes to looking for funding, we have to look at innovative funding sources and once you get them you have to allocate it properly and use it up in your budget. So, that the systems that you want to implement are actually built on the road.

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Finally, it comes to implementation. It is not only once you build it, you can forget about it, but you have to also take care of it. So, operations and maintenance plays a very important role. We often see sidewalks that are built newly are very good, but their conditions deteriorate very quickly or the crosswalk paint dries off and nobody repaints at all time. So, it is not only implementing it the first time, but you have to always operate and maintain it as well.

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So, that concludes our first introduction lecture on non-motorised transportation systems. What we looked at in this lecture was the different forms of non-motorised transportation systems, the need for it, the different benefits that non-motorised transportation systems have. We also looked

at several issues in non-motorised transportation systems, especially in India, and also how India has some inherent benefits that it can gain. And also finally, we looked at the five key steps in the planning process.

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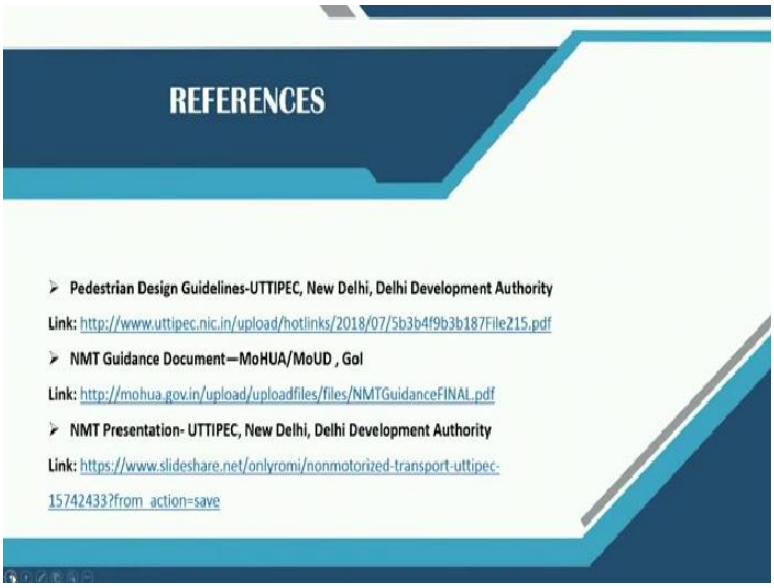

These are some of the resources that you can use for learning more about what was talked today. And I look forward to having you in the next lecture module. Thank you.