Introduction to Multimodal Urban Transportation System
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Lecture-22
Non-motorized Transportation (NMT) Planning: Assessing Existing NMT Scenario

Hello friends, welcome back to the next lecture in the series of non motorised transportation. In the previous lecture we had looked at how to define non motorised transportation, their different benefits and a generic 5 step planning process.

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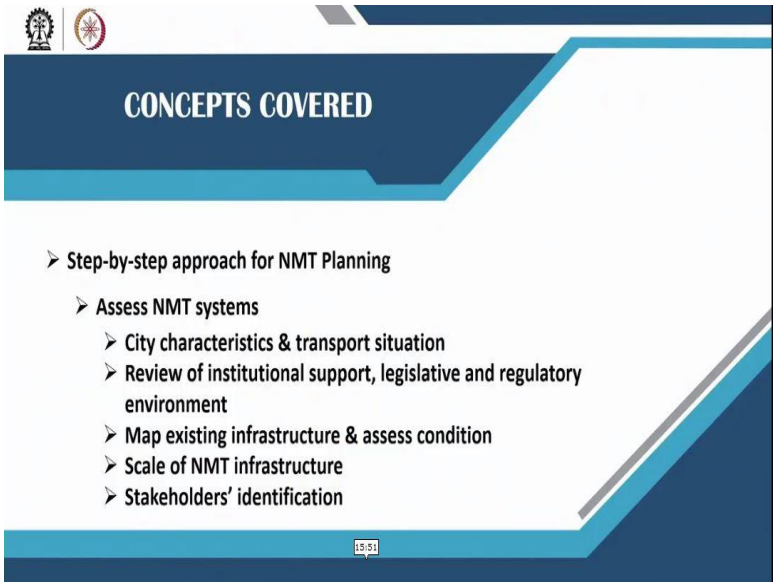

So, in this lecture, we are going to go into detail about one of the 5 steps that we have learned, which is assessing non motorised transportation systems. And particularly within that we will be looking at how to determine the city characteristics and the transportation situation, look at different institutional and regulatory environment existing in the city, map the existing infrastructure, assess its condition and then get into how to determine what scale of NMT infrastructure is needed and who the stakeholders for that are.

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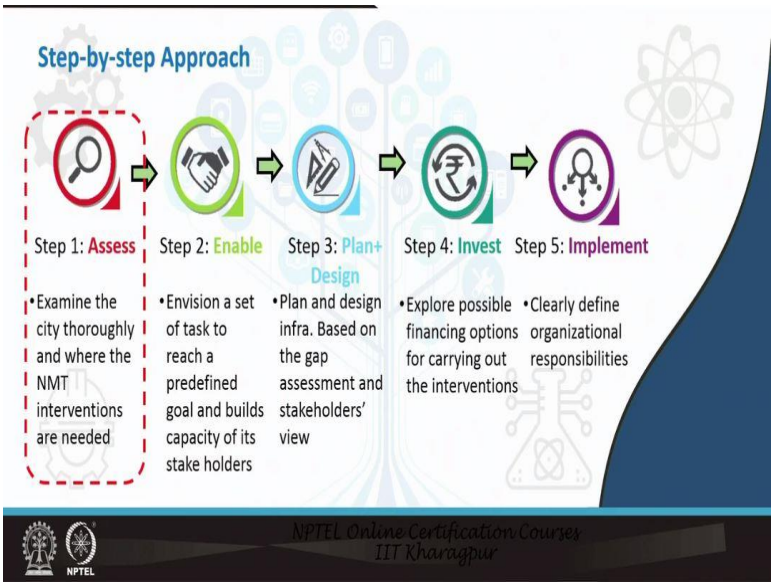

So, you may recall this figure, which gives you the 5 steps in the NMT planning process. And now, we are going to look at the first step which is assessing the situation. Just a brief overview about the document from which all the material has been taken, this is a guidance document. Again guidance means that it is not a standard so, the values or the numbers given in the document may change from city to city.

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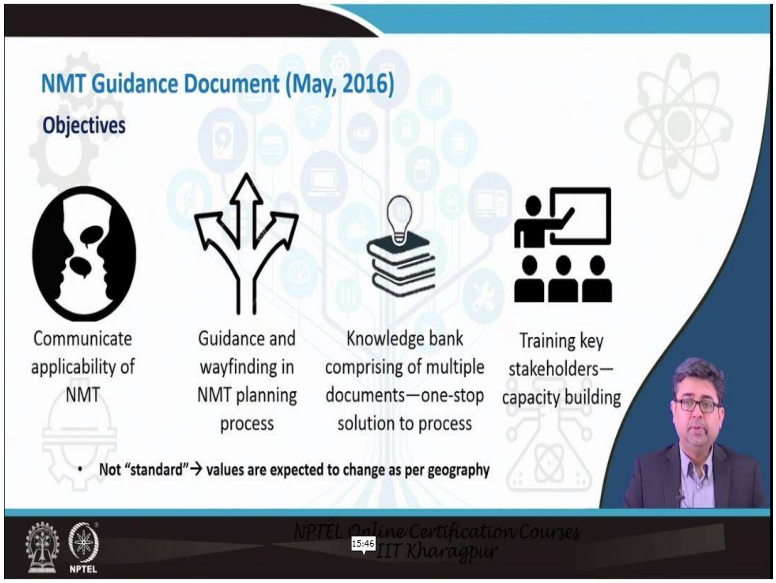

However, the guidance document gives you a knowledge bank. It is developed based on the best practices from not only India but also cities outside India, how they are developing their non

motorised transportation infrastructure. So, this is very helpful in understanding and getting a perspective of how NMT planning process should be.

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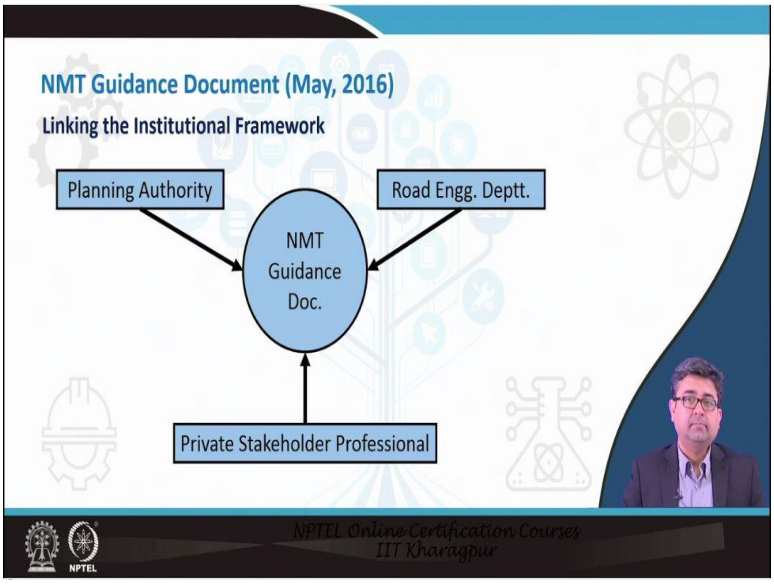

The guidance document has been developed, keeping in mind both planning and engineering departments as well as stakeholders from the private professional field. So, there has been input from all of these three different types of expert groups. And based on their input, this guidance document has been developed.

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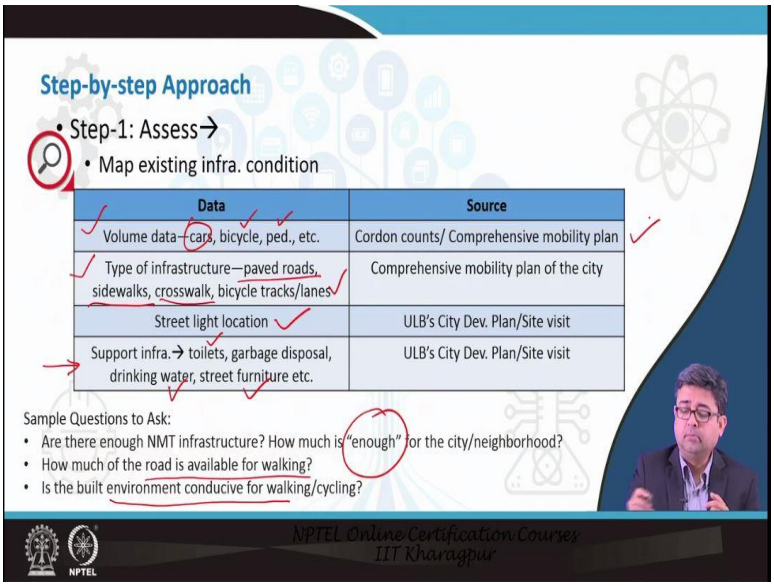

So, when we talk about assessing the available infrastructure in the city, and so that we understand how non motorised systems can be developed, we need to ask ourselves three

different types of questions. Generically we ask ourselves—first "Is walking a choice of mode?" So, are you walking out of choice or out of necessity? That is one very important thing we need to identify. Parallelly, we need to know "What is the social demographics of the city?" And also "What kind of trips are you making?" Using the different types of non motorised modes. So, are you bicycling to work? Or are you bicycling to a grocery store? Are you walking only for fitness and exercise? Or are you actually walking to go to a medical store or go to your work also often? What are the different types of trips that you make using non motorised modes?

What is your social demographics? How many trips do you make in a day? All of these gives you an overview of the transport situation as well as links it with the city characteristics. So now, for that to happen you need to have certain amount of data you need to collect otherwise your assessment may be very qualitative in nature, although we also want some qualitative perspective, but having a quantitative perspective along with the qualitative perspective will make the planning process more strong and accountable.

So, the data you can collect the for example, the street network data can be collected from any of the city's comprehensive mobility plans. The different types of modal share trips are also in the CDPs; you need to collect accident data which are available in the Indian situation, they are available in the police FIRs. What is the air quality of your city along different types of roads? That may be available from the pollution control board. So, these are some examples of the data that will allow you to review the city's characteristics of the transport situation.

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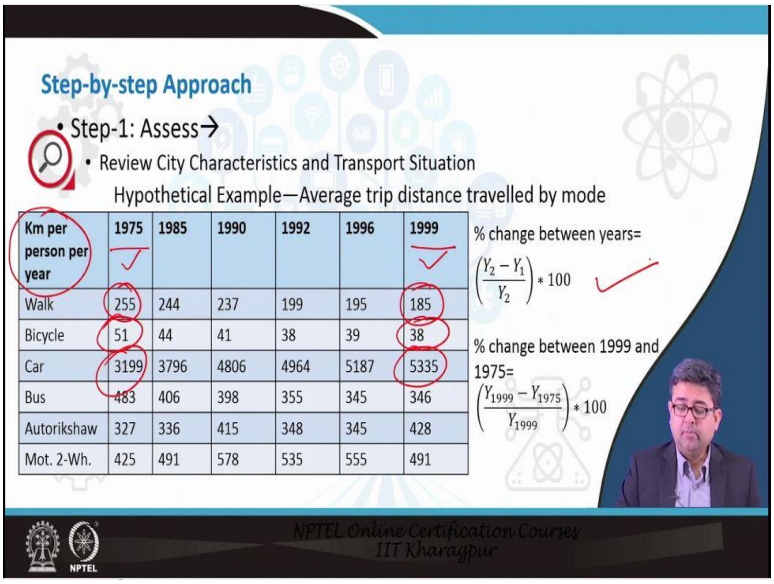

Km per person per year	1975	1985	1990	1992	1996	1999
Walk	255	244	237	199	195	185
Bicycle	51	44	41	38	39	38
Car	3199	3796	4806	4964	5187	5335
Bus	483	406	398	355	345	346
Autorikshaw	327	336	415	348	345	428
Mot. 2-Wh.	425	491	578	535	555	491

Here is an hypothetical example of the average trip distances traveled by mode. What we are showing in this example is the kilometers per person per year travel. So, there is data available from 1975 to 1999 showing that there are 255 kilometers per person per year. So, in this may be one particular city or one particular neighborhood or whatever it is.

So it is a 365 days data for 255 kilometers of walking used to happen in 1975 whereas that has now, in 1999, it has reduced to 185 kilometers per person per year. Similarly, bicycle data, a bicycle kilometers traveled is also present. Car data is also present. So, there are different types of data available to understand the transportation situation in your city. So, what you need to do is just in order to know how much change has happened from '75 to '99, you can simply understand it by using this formula.

$$\left(\frac{Y_{1999} - Y_{1975}}{Y_{1999}}\right) * 100$$

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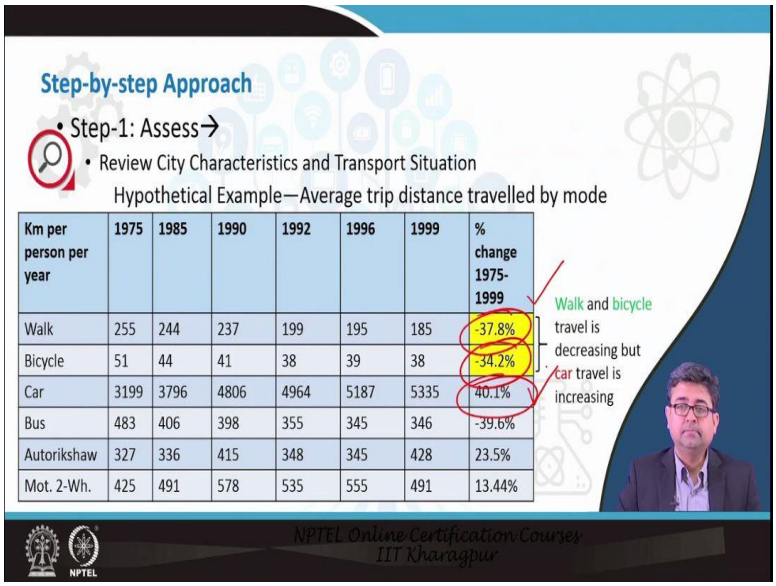

So, you would see that walking is decreasing as a negative percentage means decrease, bicycling is decreasing whereas car use is increasing. The data kind of tells you what kind of infrastructure is also in place. Maybe the walking infrastructure provision of walking infrastructure in this particular city is not that good. And that is why the percentage of people walking is decreasing, whereas the provision of infrastructure for motorized traffic or for car traffic is pretty good.

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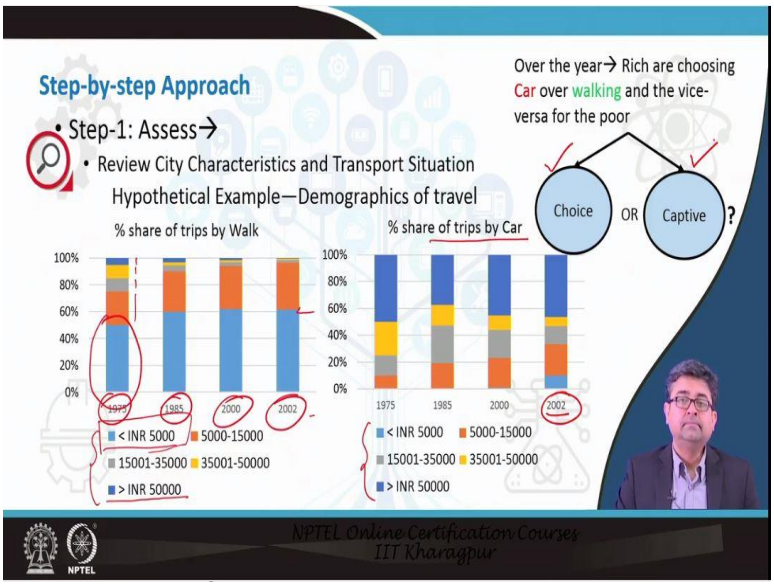

And that is why a lot of people are using that cars, which may be one of the reasons. The next thing is to understand the socio-demographics of your city, which are the people? Who are using, motorised versus non motorised modes? So if you look at these 2 charts, you would see that all of these charts are divided up by year and grouped under different social demographic groups.

So, light blue indicates the group of people who earn maybe less than 5000 rupees per month, whereas it increases so on and so forth and goes to the dark blue, which is they earn more than 50,000 a month. It is just hypothetical data. But it what is shown here is that in 1975, all of those people who earn less than 50000, very close to 50% used to walk and the other shares are shown here. You can then track that in 2002, the percentage of walking by lower income groups has now gone up to 60 percent and you can assess the others. Similarly, the second chart shows you the percentage share of trips by car. So, again, having this kind of data from your city, from your comprehensive mobility plans of your cities allows you to understand where your city currently stands. If you have current data (say for 2020), then you can plot a similar kind of chart and see what is happening with the different socio economic groups. The important thing is to understand whether people are choosing to walk or use non motorised modes, or are they captive users; captive users are usually people who do not have a choice. Maybe they are socio-economically or socio-demographically poor or they live in remote areas where there is not enough infrastructure available, so, they are captive to some kind of mode. That is the difference between a choice user and the captive users.

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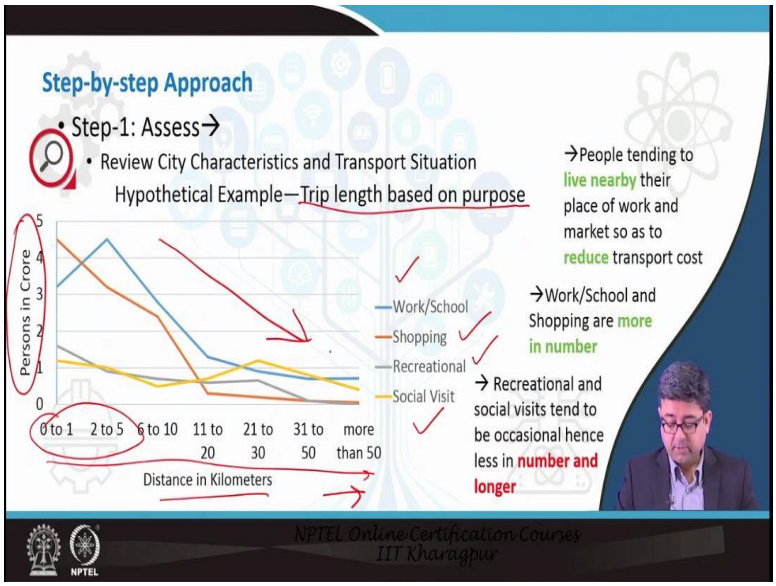

The other type of data that may be available in in your city is trip length based on purpose. So, you see the 4 different lines here, each of these lines represent whether you are making a trip for work or to school, that is a shopping trip whether it is a recreational trip or whether it is a social visit trip and then the Y-axis represents the people number of people in crores and the X-axis represents the distance in kilometers.

So, you see as the distance increases the propensity to use non-motorised modes for different trip purposes decreases. If the trip distance is very less, so if it is a very short trip, i.e. less than 1 kilometer or even between 2 to 5 kilometers, more number of people are likely to use non-motorised modes. It is intuitive, you do not want to walk long distances neither do you want to bicycle for long distances. But if it is shorter distances, then you would use non-motorised modes. As the distances increase, you will see that the number of people using non motorised modes decrease. So, they have a declining trend. This again tells you, maybe the land use in your city is very segregated. Maybe they have different land uses at different spots, so they do not have a lot of mixed land use. In that case, what happens is people have to travel longer distances and when people have traveled longer distances, your non motorised transportation share decreases.

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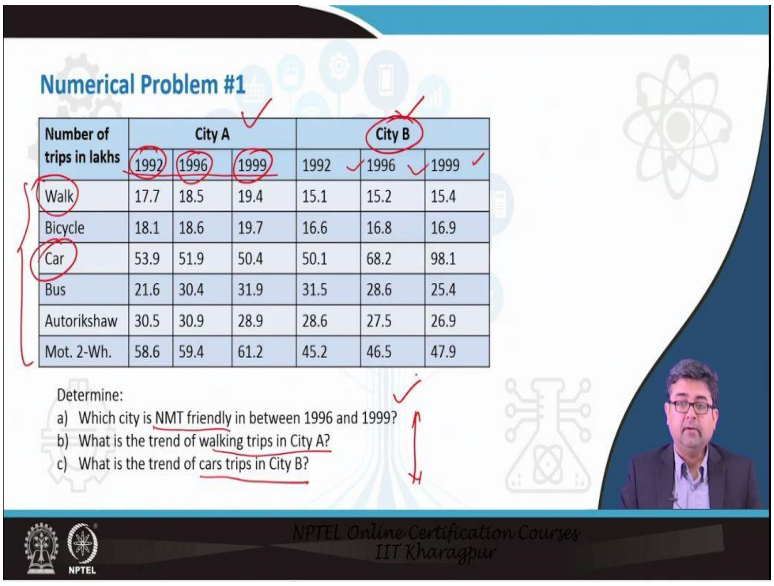

So, here is a numerical problem which will help you explain better. Given our data from 2 different cities and different types of modes that are used by the people in these cities. Again, it is time series data. So, there are 3 different time periods for which data has been collected. Now based on this numerical problem, what we need to understand or what we need to determine is which city is non motorised transport friendly in between 1996 and 1999 between these 2 time periods with city is non motorised friendly? What is the trend of walking trips in city A? This is only based on city A walking trips only. And finally, what is the trend of car trip in city B?

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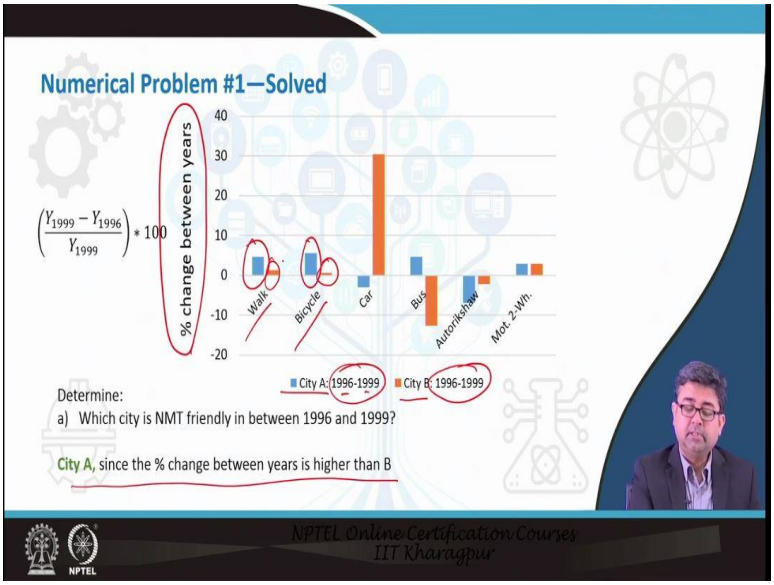

So, in order to answer the first question, which city is NMT friendly between 1996 and 1999? What could you do? You would essentially develop a chart which shows percentage change between those 2 years. If the percentage change is positive in the case of non motorised-modes, that means that city is more non-motorised friendly. Whereas, if the percentage change is negative between among the non-motorised modes that would tell you that the city maybe is not so, non-motorised friendly.

So, here what we did was city A is represented in blue and city B is in orange. And this is the difference or percentage difference between these 2 years. So, what we see for the non motorised modes, the non motorised modes there are walking and bicycling, the rest of them are car, bus, autorikshaw and motorised 2 wheelers are motorized modes. So, when we compare these 2 cities what we see is that city A is a bit more non motorised friendly.

Because both of them are positive city A and city B both are positive, nobody is negative. So, they are moving in the right direction as far as non motorised transportation is concerned. But the percentage change in city A between 1996 and 1999 is much better than the percentage change in city B. So, we can say that city A is more non motorised friendly city than B.

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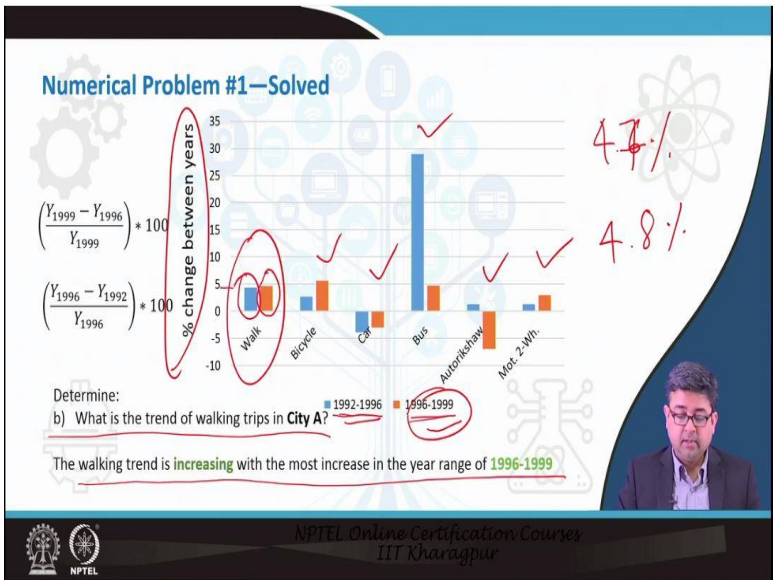

Next question was to understand what is the trend of only walking trips and only for city A? So, again, we can draw trends. Because, three different years were given, you could see what is the difference in the first, 2 years '92 to '96 and then, from '96 to '99. You can draw such a chart from that table and again, on the Y-axis, you can have the percentage change.

So, when we start looking at what are the trends in walking trips only, we have shown you all different types of trips here, but the question was only for walking trips. So, you would see that the walking trend is increasing in both 1992 to 1996, as well as from 1996 to 1999. So, it is an increasing trend both cases it is positive. And at the same time the increase between 1992 and 1999 was maybe somewhere around 4.7 percent whereas from 1996 to 1999 that increase has gone up to 4.8 percent. So, there is an increasing trend. This also gives you an idea that your city is doing well in terms of walking, which is one of the mode of non motorised transportation, it is doing very good.

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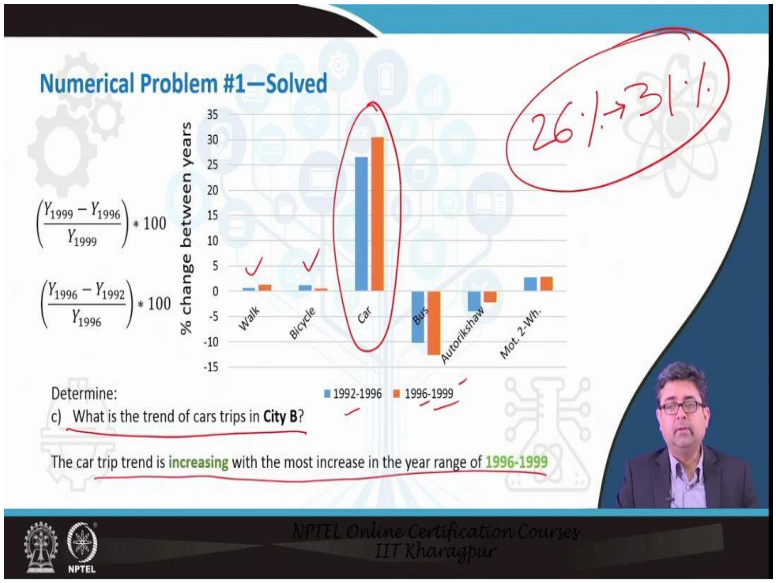

Similarly, the last question that was asked was what is the trend of car trips in city B? Very similar charts to the previous ones, here we have again showed you all different types of modes but the question is only about car trips. So, again, the car trip is also increasing between 1992 to 1999 in both of the cases its between '92 to ‘96 there was almost a 26 percent increase in car trips, whereas from 1996 to ‘99 there was almost an increase in increase of 31 percent car trips, so, this is also increasing. So, there is city B, which we first saw in the first example, as is a less non motorised friendly city and that is also now here reflected by the case that it is also showing an increasing trend in car use which is a motorized mode. So, both of those together you could say that city B is not so friendly for non motorised transport. So, I hope these simple examples clarify that how you can use data from your city's comprehensive development plans or comprehensive mobility plans in order to assess the existing transportation situation in your city.

Now, the next step in assessing the conditions is to map the existing infrastructure and its condition. Now, know your city's trends, which are the good trends which are not so good trends? Thereafter, you have to develop a map of the existing infrastructure that is in place. So here again, we asked 3 simple questions. Are there enough NMT infrastructure? And how do you define enough? How do you say it is enough for your city or your neighborhood? How much of the road is available for walking? There may be a lot of road space/ pavement space, and there may be lot of the right of way, but how much of a percentage of that right away is available actually for walking? So, you are aware that in many of the Indian cities, the walking space is usually encroached upon by various number of entities such as maybe hawkers, maybe parked vehicles, maybe utility lines and so on and so forth. So walking space, although is demarcated, is encroached upon most of the times.

The third thing to ask is the built environment conducive for walking. Now what is built environment? Built environment usually represents the environment in which you are walking which is built by somebody, it is not a natural environment. So a natural environment of walking would be walking in the forest, walking in some naturally wooded areas, but when you are walking in a city, usually it is a built-up forms. So there are different types of built conditions. Would you feel comfortable walking alongside a factory as opposed walking alongside a mall? So, these are 2 different types of built environments and where would you be more comfortable? So that is also a very important question to ask when you are assessing the non motorised transportation situation. Again, in order to map all this, you would need different types of data, you would need volume data of not only the non motorised modes, but also the motorised modes. You would need the type of infrastructure that is available in your city. Is it just paved roads? Not only paved roads, but where are the sidewalks? How long are the sidewalks, how wide are the sidewalks, which are the locations that have zebra crossings how many bicycle lane miles or lane kilometers do you have? Where are the streetlights? What are their locations do they cover? Do they have enough coverage? And also, when you are talking about non-motorised, especially about walking (pedestrians), you have to know where your toilets are along the way, the public toilets, drinking waters, street furniture such as benches and all. So you have to map these things, unless you spatially know where it is, not possible to quantitatively assess how good or is it adequate enough for your city. For mapping the infrastructure, all of this data should be available

again in your mobility plans or you, yourself collect data by conducting site visits, cordon counts, etc.

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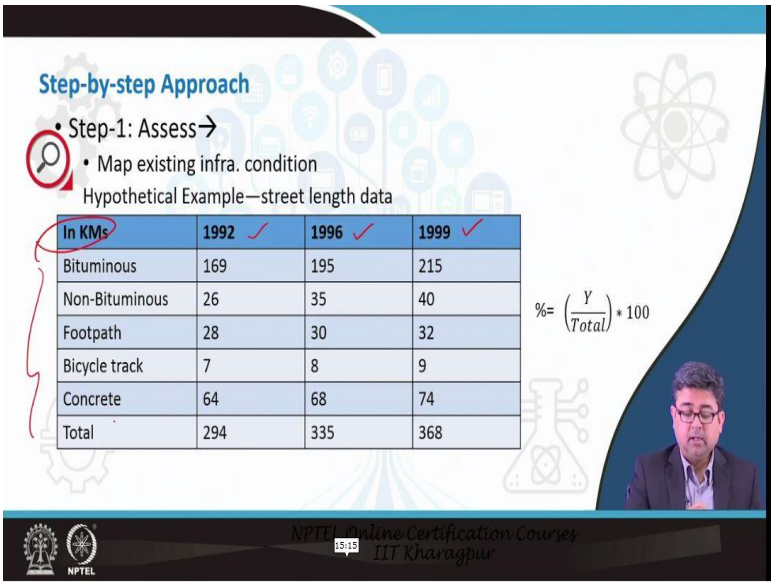

So, again this is a hypothetical data that we have used again for 3 different years, where we have shown the length of infrastructure that is available in kilometers for different types of facilities—bituminous roads, non-bituminous roads, footpath cycle track and concrete infrastructure, so, this is just the data that is available. Now you can easily see that bicycle tracks

Percentage change from year to year is very low, whereas, bituminous we are building a lot of roads, but we are not including cycle tracks in those roads.

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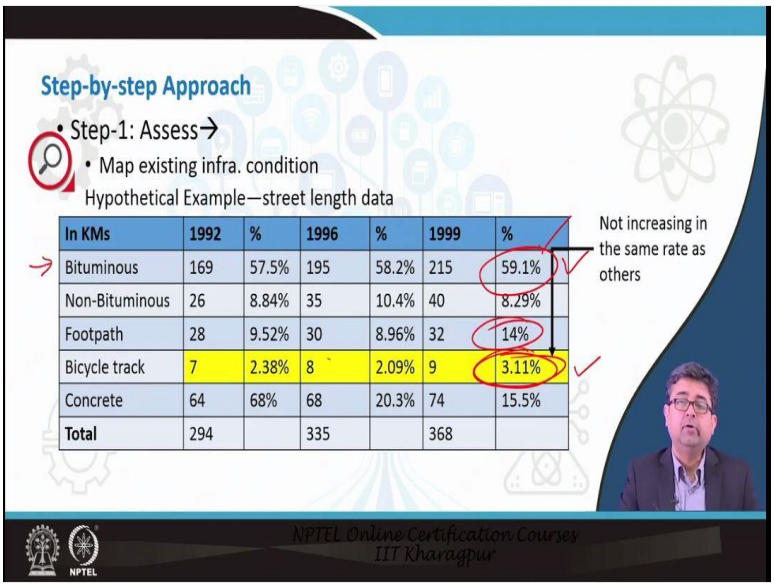

So, if one sees only the bituminous pavement length, then they would feel that, we are building a lot of roads, but that does not mean that we are building a lot of bicycle tracks which are usually marked on the roads. Sometimes they are off roads as well, but many cities or many cities in the West and in the developed nations have bicycle tracks now which are on the pavement itself. Similarly, you would see footpath although it is higher than bicycles, but its way lower than bituminous roads. So although we have roads, but we do not have footpaths along those roads, again you have to be very careful when you say that the length of road is not always equal to the length of footpath but it has to be somewhere in proportion to the footpath. So maybe there is another classification that you need to find out. It is bituminous roads along urban collector maybe that is what something you are to look at. Collector roads usually should be pedestrian friendly.

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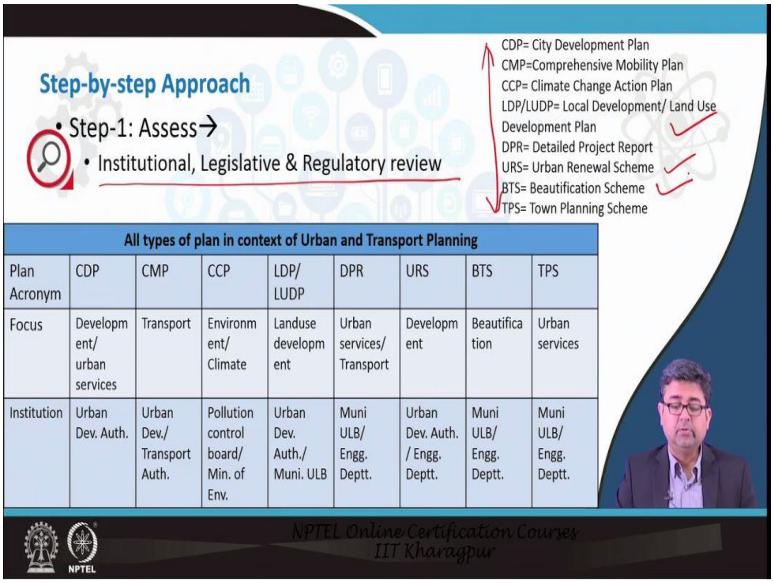

So then the next step is to identify all the different institutional, legislative and regulatory issues in your city. It is very, very necessary to understand all this otherwise, you would not be able to plan for it. So, in order to understand all that, you have to be familiar with different types of plans, ranging from city development plan to urban renewal schemes to land use development so, you will see that non-motorised transportation is a combination, a well-integrated domain of civil engineering as well as urban planning and architecture.

So, you have to, if you are a civil engineer, cross over and also know about land use, beautification schemes, whereas, if you are an urban planner or an architect, you also have to

understand how the transportation mode shares happened and how all of those happen. So, it is an interdisciplinary field and you have to know about all these institutional regulatory things.

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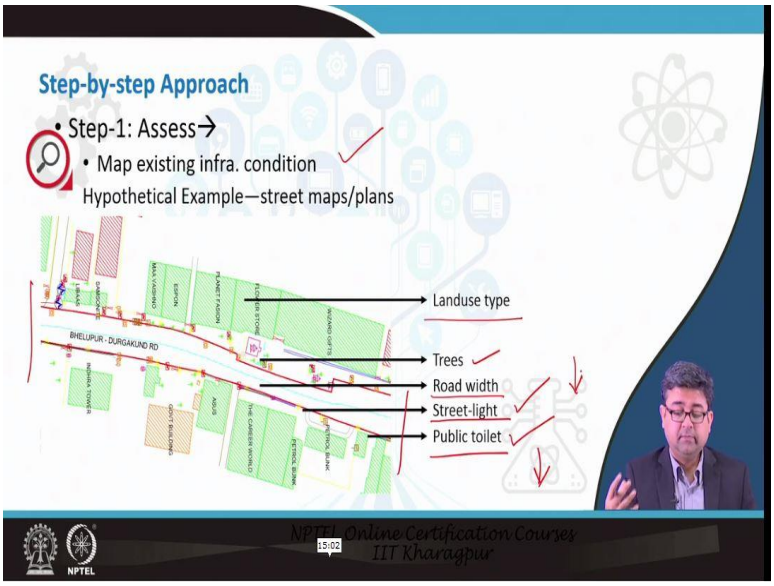

So, this is an example of how you can map the existing infrastructure condition. This is just a short stretch of a street from here to here. You could know the width of the road, you could map where the trees are, and that gives shade comfort to people who walk. You need to know, what the land use type is, and that will give you the built environment around it. Built environment again, makes your perception of walking different for different types of built environment.

You can mark all the public toilets, all the streetlights, so this gives you a detailed existing infrastructure. This map shows just an inventory of all the infrastructure that is available, the next step would be to go ahead and determine the condition of it. So, a public toilet is present, but a public toilet's condition maybe not that good. So, that also has to be documented, street lights may be present, but streetlights are not functioning, i.e. half of the bulbs are out of order.

So that also has to be recorded, unless you do record all that you will not be able to plan for good non motorised transportation facilities. So this is a snapshot of how to do it.

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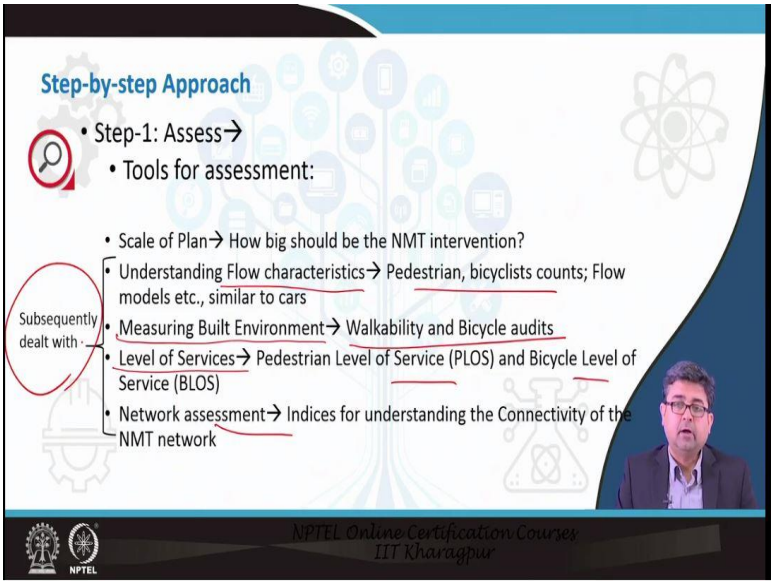

And like I said, you have to then assess it. And there are various assessment tools for non motorised transportation which we are going to get into in the latter half of this class. Just to give you an idea what are these tools they are different you can measure the built environment, walkability and bicycle, by using walkability and bicycle audits, you can develop level of service scores for both pedestrians and bicycles to understand how good your infrastructure is.

And you could do also a network assessment. So, as well as flow characteristics of different pedestrians and bicyclists. So, all of this will be dealt with in the coming classes of non motorised transportation.

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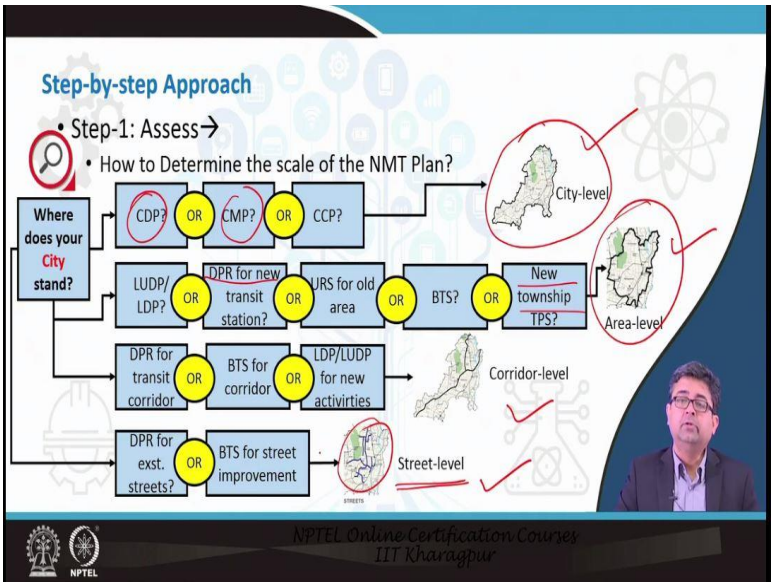

Finally, you have to understand this scale of the project you want to implement. A non motorised transportation usually happens at 4 different types of scales. If you want to improve non motorised transportation at your city level, if the entire city is your scale, then you have to consult their city development, city mobility plan or comprehensive mobility plans, comprehensive development plans and so on and so forth. If it is only for an area within a city, you are only looking at certain pockets for which you want to develop that. So, then you have to look at maybe that is a new township. So, there are some township plans, some DPRs for large transit systems, metro systems or DPRs and metro only goes to certain parts of your city. So, you can then develop the NMT infrastructure at that area level. Similarly, if it is for a corridor and are planning around the metro stations of your city, Metro runs on only particular corridors, so, you can then develop the NMT infrastructure at that corridor. Finally, if it is only for a street, which needs beautification, which needs pedestrianisation and would see many of the cities now are identifying certain streets their CBD areas in their central business districts and demarcating them as only pedestrian zones. So, where the land use is very different with a lot of restaurants many people can just walk to and maybe it is only during the daytime that it is designated as pedestrian zone or only during the weekends during the night. So, there are a lot of these kinds of things that are only specific to certain streets in the city. So, there are these are 4 different scales at which you can implement your non motorised transportation plan.

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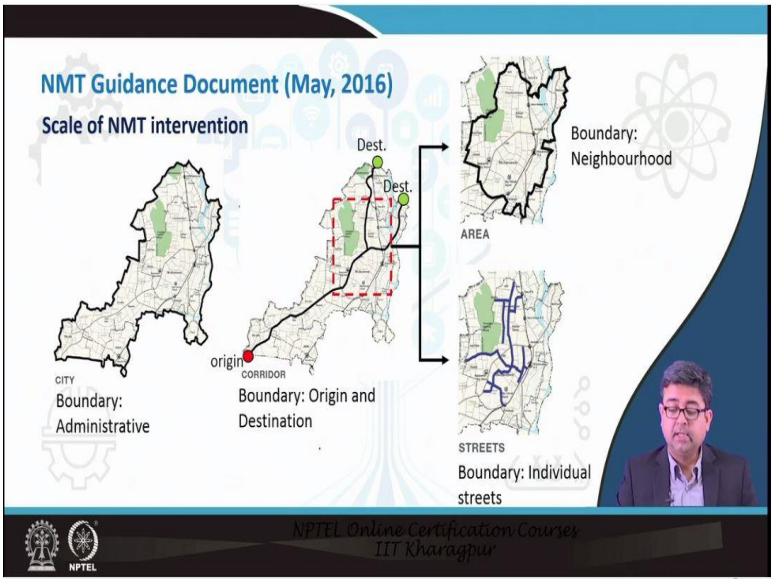

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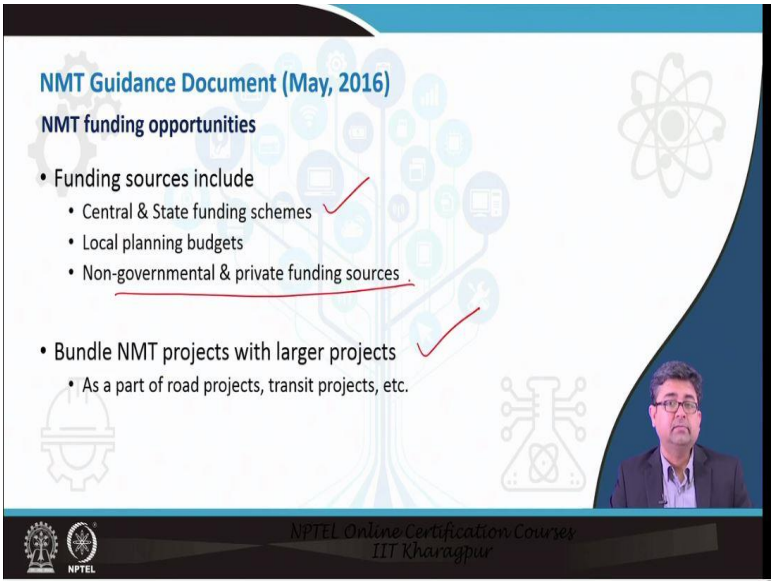

This is the illustration of what we just said. And we are now almost coming to the end of this lecture. Finally, you also have to know what the funding opportunities are. NMT funding opportunities are usually bundled with larger projects. So, one has to be very careful during its implementation, because footpaths are usually not funded separately unless it has to be retrofitted. Usually what happens is when a road is repaved a new road is built, a footpath is built along with it. One has to be very careful that once the road pavement is built, the contractor or whoever is authorized to build it also construct the footpath as per design. So usually what happens is the funding is bundled together. However, you can also look for isolated funding, that are all that are available from various Central and State schemes, also local planning budgets and also private funding sources. Many times what happens is if you are in a market area, along that street shop owners may pool-in money and have the footpath built in. So those are private sources. So you need to also tap into such sources to build your non motorised transport infrastructure.

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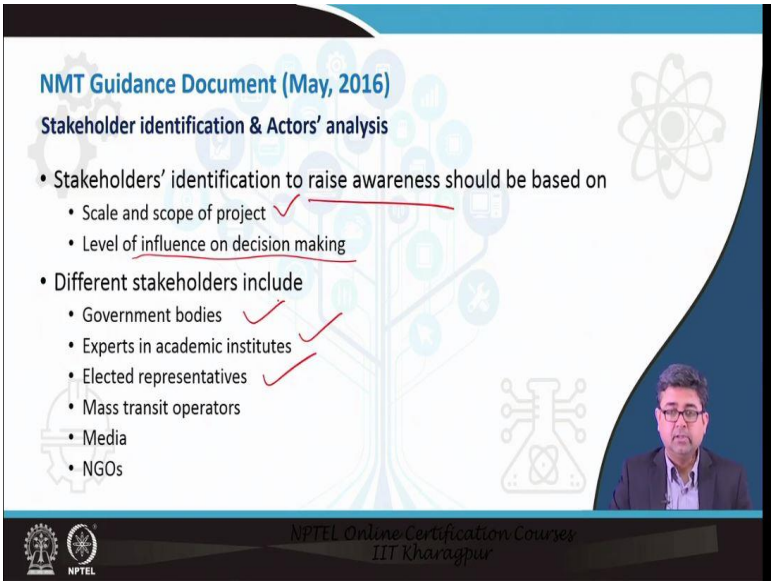

Finally, you have to understand who the stakeholders are in order to raise awareness. Many people are not even aware that there should be infrastructure at this place or that place. Or they take it for granted that we just walk on the street, we do not need an infrastructure. But you have to raise awareness among them in order to build these infrastructures. So based on the scale and scope of the project, and also you have to make sure that you have sufficient stakeholders who can influence decision makers. You have to talk to your elected representatives, may be experts from academic institutes, different government bodies. So you have to build your case, in order to have this NMT infrastructure implemented. Many times it happens is everybody usually loves the idea of having a good pedestrian facility or a good bicycle track, but they do not know how to actually implement it. So, in order to know how to actually implement it, you have to have the right stakeholders in place and raise awareness raise funding, so that this projects are implemented.

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Here are some references from which most of the material was shown to you. This can be downloaded for free and the third one is a textbook, which you can read further to gain more knowledge.

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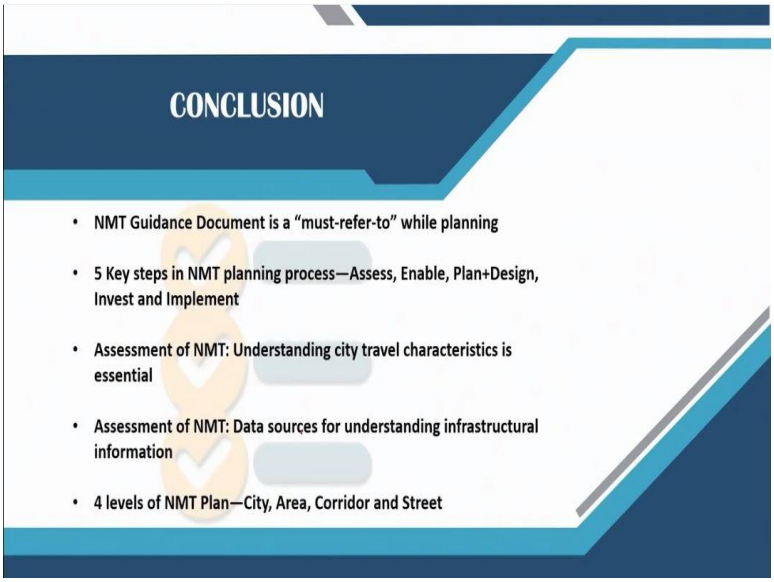

So in our lecture today, we have looked at the first step in the 5 key steps of understanding of planning for NMT we have looked at assessment, understanding city level characteristics, what are the different data sources to have the information about your city and also how to plan for different scales of NMT infrastructure. Thank you.