Urban Transportation Systems Planning
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Lecture - 05
Hierarchical Levels of Urban Transport Planning and Interrelationship of Transport Problems and Models

Welcome to module A lecture 5 this is the last lecture of this week and also the last lecture for module A. In this lecture we will talk about hierarchical levels of urban transport planning and also we will discuss about the interrelationship of transportation problems and models.

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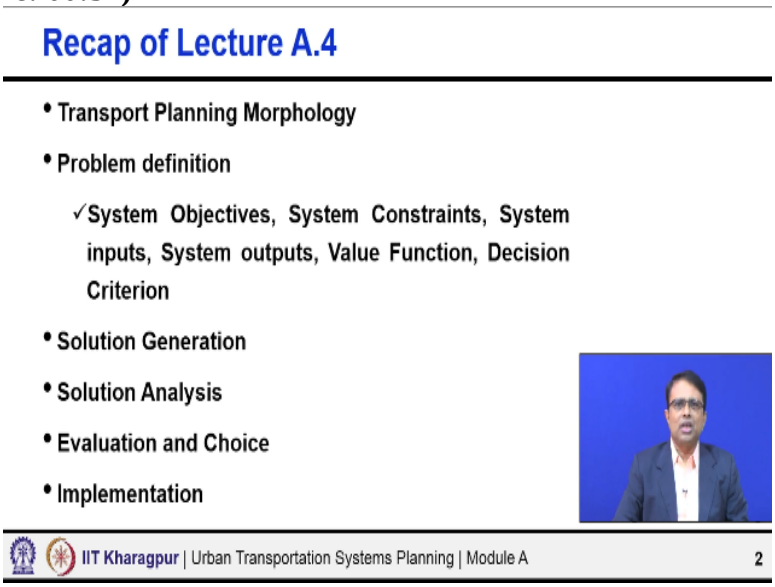

In the lecture 4 we discussed about transport planning morphology we talked about various components starting from problem definition to solution generation to you know analysis of solution and then evaluation and recommending the most desirable solution and then implementation of that solution and also we said how important it is to work out in the problem definition stage.

Because it includes everything identifying the system objective, identifying the system constraints the inputs outputs value function, decision criteria. So everything we try to set in the problem definition stage.

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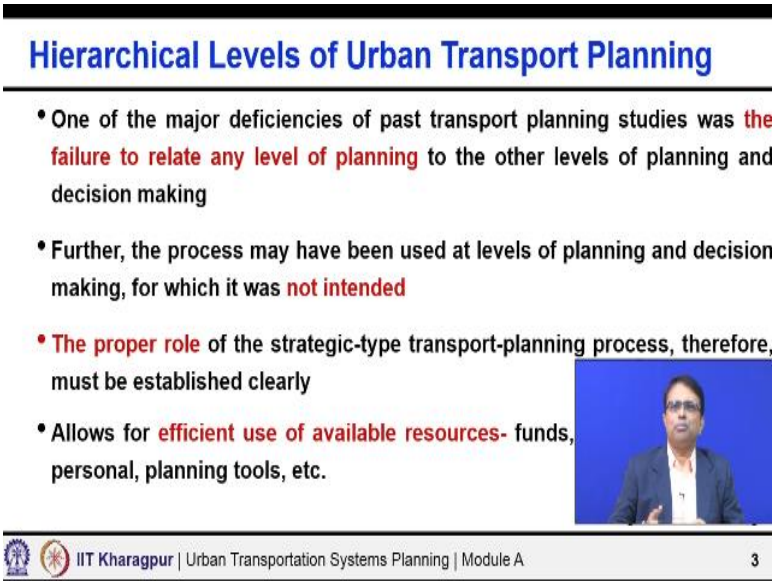

Now today we shall talk about hierarchical levels of urban transport planning, in the past transportation planning, one major deficiency which was identified was the failure to relate any level of planning to the other levels of planning and decision making. There are different levels the planning works are done and it is very important that how you know one level of planning to next level of planning to next level of planning.

Sometimes one stitch up or one stitch down different layers of planning I can say in that way to get connected properly that is very, very important. So, that was one major issue which was identified or one problem which was identified in the past transportation planning studies and even sometimes you know it was observed that transportation planning studies produced outputs, which was actually not intended it was something else which was really required at that level.

Hierarchical levels of transportation planning and integration of different levels of planning rather is important because that can ensure efficient use of available resources you know that always the resource is limited. So, in terms of funds, in terms of manpower, in terms of planning tool whatever you say. So we want to make sure that whatever planning is done at some level they are compatible and meaningfully connected to other levels of planning process.

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Transportation planning normally should be associated with the comprehensive regional planning program this is again very important because you know that transportation is a derived demand. It all starts with the spatial distribution of activities, how different you know areas are growing or getting developed and then the need for developing the transportation system. So transportation and overall regional development these 2 things are extremely you know are highly integrated with each other.

I mean there are interdependencies as well so we cannot do you know transportation planning studies without looking at the regional planning program. So that again to be associated or integrated or interlinked in any urban region planning studies are usually conducted at various levels as I said that there are different focus and everything is important you know different levels things are important.

So, we can say that there are different types of transportation planning studies rather at different levels the transportation planning studies and various agencies are involved for planning design implementation control and everything is happening together I mean somebody is looking at the overall larger perspective of the city to somebody looking at some specific aspect or in specific areas.

So there are multiple organizations who are continuously working so again this integration of or the coordination of all these studies is extremely important. A continuous or periodic updating of the plans resulting from the studies is done by feedback of information from any level to a less detailed level or an input to the next more detailed level. I will show you a

flowchart or a sketch to explain this further, what we are trying to say here that they are different levels.

You know first level may be a very gross level of work you are doing then next level of planning study is a little bit more detailed. Then next level further detailed things are worked out so, if we think at one level whatever is happening, that has something to do with the previous level that level of planning study and also something to do in the next detailed level of studies. So you know one level when you are carrying out you know transportation planning studies.

It gets interlinked or it should get interlinked logically and meaningfully to the previous level which is much grouser much broader than the present one and also same way should get integrated and interlinked with the next level which is even more detailed.

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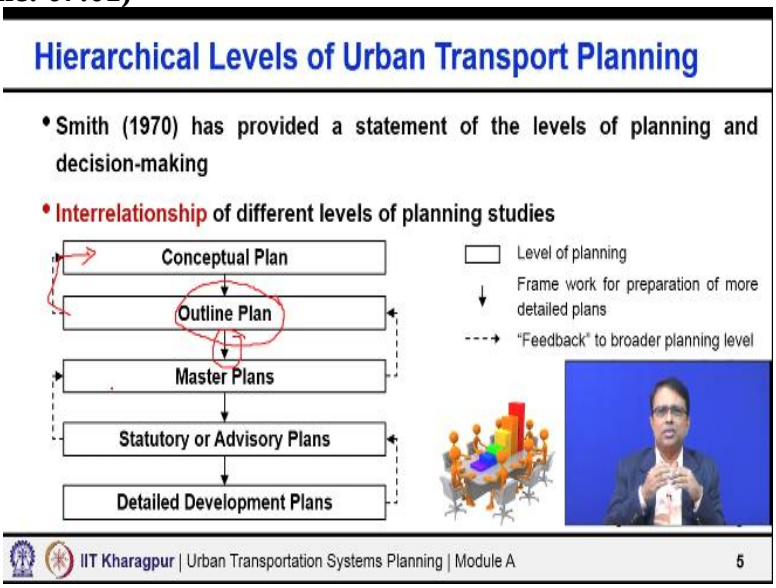

So let us look at this next sketch there are many sources many resources rather available but I personally still like you know this Smith 1970 that work and this paper or this work is also available online in public domain. I have included it in the list of reference so you will find it when you receive the material you may go through it. So very brief concept from that very briefly I will you know try to tell you the concept.

So, interrelationships of different levels of planning studies, is actually explained by Smith and why he considered. You know 5 levels the very broad the bigger umbrella is basically the conceptual plan that is the bigger umbrella to start with then next level is basically the outline

plan. Then further details master plans then going even at a smaller and much more detailed level is the statutory or advisory plans and finally the detailed development plan.

So these are you know all the 5 levels and if you see each level is actually linked with the next level so if you say that this is the outline plan level. You can see that outline plan level is also linked with the feedback arrow with the conceptual plan level and then again, it is also linked with this feedback arrow to masters plan level. That is what I was trying to mean that it should logically get interlinked to the immediately higher level and also immediately more detailed levels of plans.

Now I am showing here the box each box indicates obviously the level of planning and the dark arrow indicates the framework for preparation of more detailed plan and the dotted arrow or the feedback, it indicates the feedback to broader planning level. Now how different they are from each other. That means if I say one thing I am seeing again that it is basically much broader starting from concept plan to the most detailed level work that is there in that detailed development plan.

And the intermediate stages are like intermediate steps so outline plan is more detailed than concept plan but less detailed than master plan, master plan is more detailed than outline plan less detail than statutory or advisory plan and so on. How are they different how I can you know in which aspects one plan is different from the other?

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There are actually several characteristics which can be used advantageously to describe how one level of planning is different from another level of planning. So, in this slide I have mentioned those important characteristics for example, they differ in terms of the principle purpose for doing this planning why we are doing it? What is the principal purpose for doing this? Then what is the plan period that is considered? Not for every planning studies it is same every level it is same.

Then how the base map is created what kind of base map is use what is the scale of this base map? As they say that you know the level 1 is much broader. So, you are considering a much bigger area as compared to the detailed plan is even at a much detailed level. So obviously, the scale will be different then how the study area system is defined? How the travel demand you know or the basic data analysis what kind of basic data analysis is carried out? How the travel demand forecast is done at what level?

Then how the future route location and characteristics are identified or mentioned? Then how the different every stage there are alternatives. So we need to evaluate them but how we are evaluating different alternatives what are the real alternatives? To what broad level or to what detailed level the alternatives are really worked out? Then also there are differences in terms of plan details the way the economic studies are you know carried out at every level.

Whatever we say whenever the alternatives are there we need to carry out you know, evaluation and try to see through economic studies but then to what level to what either is it deeper or is it broader at which level the alternatives are there and how the economic studies are carried out then the right of way definition you know how we are doing it in different levels and finally the way the cost estimates are also done.

So obviously you know the top one at the umbrella level it is you know something very different. Then the when you go for the detailed level, detail level is much more detailed cost estimates detail development plan. So, in all these characteristics one level of planning study, as I said starting from conceptual plan to outline plan to master plan to statutory or advisory plan and then finally the detailed development plan.

So obviously in as many as all these you know nearly 15 aspects probably so, things are different they are described through these 15 characteristics. Now obviously it is very

difficult within the restricted time and within the scope of this course, to go into deeper and have a detailed discussion on each of these aspects. So, I would only pick up a few characteristics just to give you a little better idea a little more idea and I would encourage you to go through this original document which is available in the public domain.

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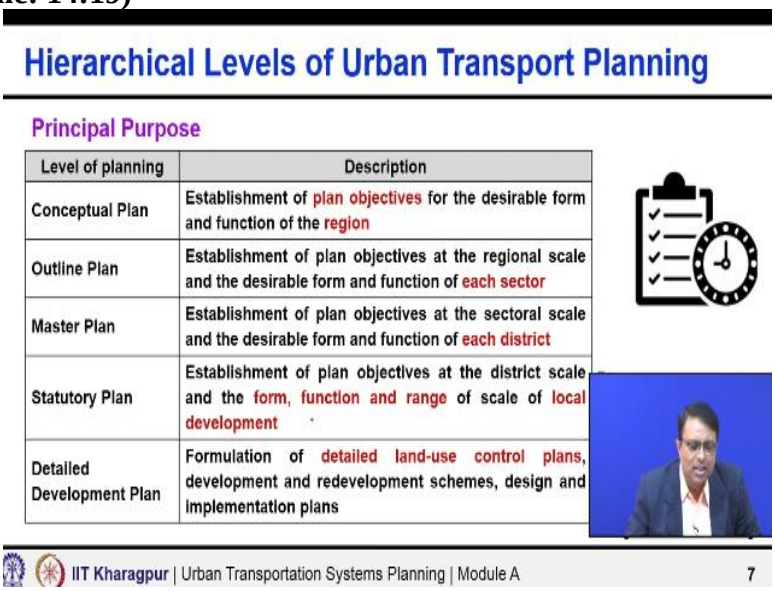

So, the very first thing is the principle purpose why we are doing it so, I take one characteristics and then try to say how they vary in different levels of plan. So, let us consider first the principle purpose, when we are talking about conceptual plan. It is basically establishment of plan objectives, we are trying to establish plan objectives for the desirable form and function of the region. Region is the larger unit you talk about Kolkata metropolitan region or Mumbai metropolitan region or Chennai metropolitan region.

We are talking about the bigger area the whole thing is one unit that is region. So we are trying to establish plan objectives for the desirable form and function of the region. So region is the consideration when we go to the outline plan then establishment of plan objectives at the regional scale and we are trying to say what is the desirable form and function of each sector?

So region gets integrated now with the consideration of sector so, maybe sector is the next unit you can think of next smaller unit than the region so region one region, a few sectors. So that means while conceptual plan we restricted ourselves to the establishment of plan objectives of the desirable form and function of the region. When you go to outline plan we

are actually focusing on establishment of plan objective at the regional scale and the desirable form of function of each sector.

Then further going into further details of master plan here we are talking about establishment of plan objective at the sector scale because already we got introduced to sector level. So sector scale and then further the desirable form and function of each district, district is further smaller than sector. So, maybe a region can be considered as you know, if you sector and then maybe each sector may be considered a few districts.

So we have gone into district level then when you come to the statutory plan then establishment of plan objectives at the district level we already got introduced here in the district level and then the form and function and range of scale of local development we have gone even farther at a smaller unit. Finally the detailed development plan here the principal purpose is formulation of detailed land use control plan development and redevelopment scheme design and implementation plan.

So you can see how from a much broader you know consideration of the region to then we are going to at sector level consideration. Then further smaller unit district level consideration to then consideration to local development and finally in the detailed development plan, the purpose is formulation of detailed land-use control plan also the development redevelopment scheme design and implementation plan so much detailed level.

So each stage is important because if you do not do one stage, if you cannot really go ideally to the next stage. So each stage is important and also the integration that feedback arrow just remember the integration that is very, very important what you were doing at one level, it should be integrated with the previous one and also with the next more detailed level so that makes the whole thing work much better.

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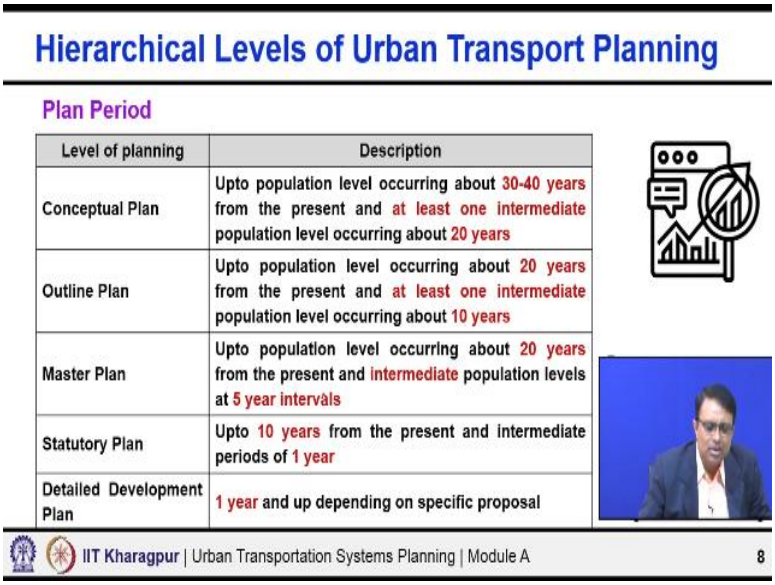

Also let us say in terms of plan period conceptual plan much bigger umbrella. So up to population level which may be occur we expect to occur about 30 to 40 years from present. That is the kind of time dimension we are talking and at least 1 intermediate population level occurring about 20 years. So 30 to 40 years that is the span and in between we are taking at least 1 intermediate level in about say 20 years.

That is the kind of plan period what is considered when we come to the outline plan. We are considering after population level occurring about 20 years from the present and at least 1 intermediate population level occurring in about 10 years. So conceptual plan we consider 30 to 40 years and intermediate one in about 20 years, here we consider 20 years and then at least 1 intermediate population level in about 10 years.

Going to the master plan further narrower so, here we are considering up to population level occurring up to 20 years from the present and intermediate population level at 5 years level interval smaller time interval. Statutory plan up to 10 years from the present and intermediate period of 1 year and finally when you are doing detailed development plan, it may be 1 year and up depending on the specific proposal.

What kind of proposal with respect to that we are working out detailed development plan so, these are all indicative just trying to tell you that how different levels exist in terms of transportation planning? How it is important to consider each level and how it is important to that each level gets integrated in a nice manner or in a cohesive manner?

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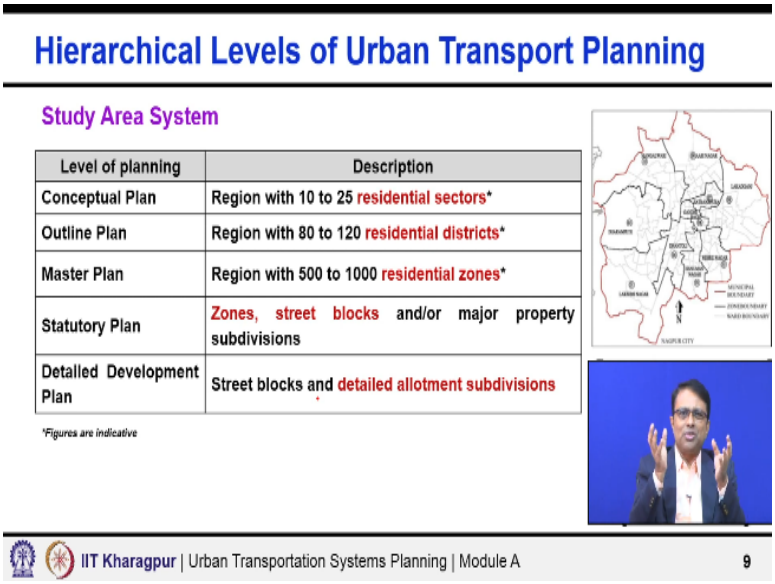

Next if we consider study area system I have told here that conceptual plans maybe were going up to residential sectors and then outline plan we are considering at the residential district levels. So district is smaller unit than residential sectors masters level residential zones further smaller. So, just to give you an example, I have said here maybe indicative only a region may have about 10 to 25 residential sectors.

So you can imagine the sectors are much bigger when you are talking about residential district then in the same region we are considering about maybe 80 to 120 residential districts. So districts are geographically smaller unit so obviously, we are going in a much detailed level and when you come to residential zone the same region may have 500 to 1000 residential zones.

So you can understand very clearly that the residential zones are further smaller in statutory plan we are considering zones, street blocks and or major property and also further subdivisions and finally, in the detailed development plan we are also considering street blocks and detailed allotment subdivisions. So, going even deeper and further deeper, that is what is the whole level; hierarchical level. First one is gross bigger larger area and then thinking going into smaller unit, further smaller unit, further smaller unit and finally developing the detailed development plan.

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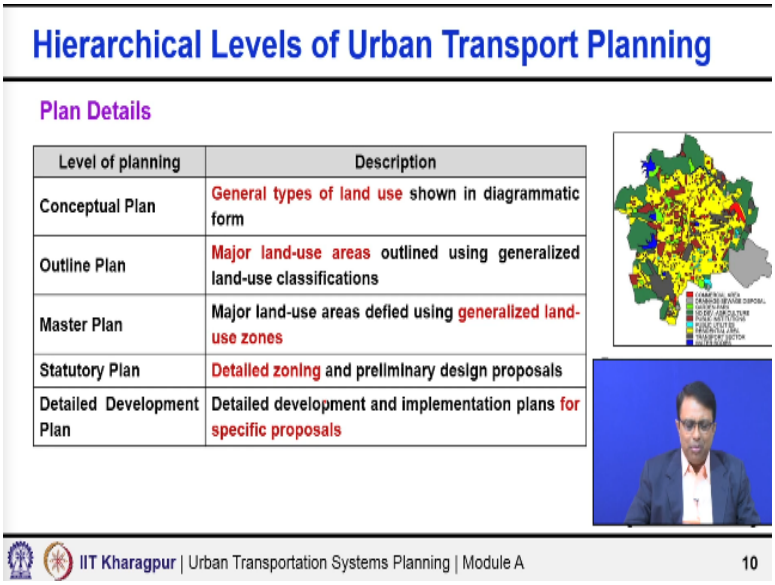

In terms of plan details conceptual plan when we are developing conceptual plan we only consider general types of land-use shown only in a diagrammatic form. Just what is the general type of land use? When you are going to the outline plan, we show the major land-use outlines using generalized land-use classification. So we are bringing the land-use classifications here and you know, when trying to identify the major land use areas when you go to the master plan.

Now master plan major land-use areas defined using generalized land use zone further details level then statutory plan we consider detailed zoning and preliminary design proposals and finally in the detailed development and implementation plan for specific proposal because detailed development plan you make with respect to specific proposals so, you can say how the plan details are also vary.

Now through all these whether it is as I said there are nearly 15 characteristics which can be used to describe how each level you know how in different levels the planning occur and how they are different from each other one is different from the other. Now, I have I took planning principle plan period and travel demand forecast to you know, to describe or to tell you a little more about the understanding of the different levels of planning.

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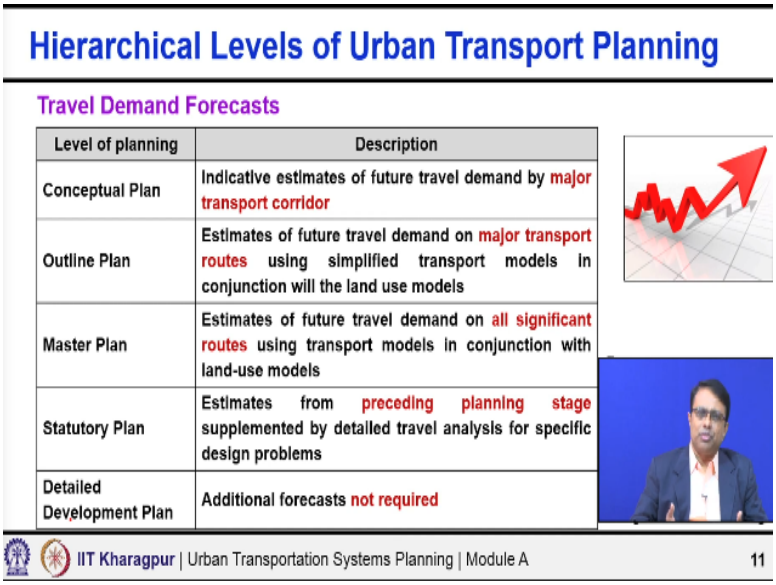

Now with this we will go to the next topic or travel demand forecast also in terms of travel demand forecast. In concept plan we do only indicative estimates of future travel demand by major transport corridors. When we come to the outline plan a little bit more details so, estimates of future travel demand on major transport routes using simplified transport models in conjunction with the land-use model so we are bringing now modelling but in a simple manner.

Then the masterplan estimates of future travel demand on all significant routes using transport models in conjunction again with the land-use model. So going further detail and when we are working on statutory plan, there we use estimates from planning preceding planning stage supplemented by detailed travel analysis for specific design problem, what is the design context? And then what is the demand with that? So demand now becomes you know a function of the design or design context specific detailed development plan of course we do not do additional traffic forecast.

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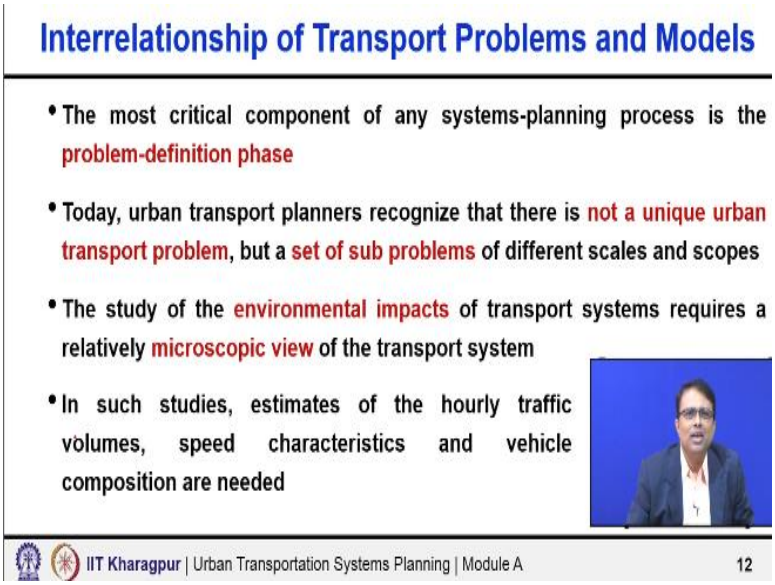

Now we go to the next topic is something again different we will close this module with a brief discussion on this topic interrelationship of transportation problems and models. All what I am trying to say I have discussed in details about the transportation systems planning process and you have seen that the most critical component is basically the problem definition stage everything is included there. Now that is the way how stepwise we should go to solve a problem.

Now today if you look at it urban transport planner recognize that it is not just one transportation problem but we are actually facing a need to solve the set of sub problems which are of different scales and the scopes are also different not at the same level. I told you that different level of planning hierarchical levels much broader to much deeper. So here also maybe the problems what we are facing or we need to address not are at the same level a variety of problems not just 1 problem.

But a variety of problem and of different scales and scopes so levels are also not safe let us give an example we will take only 2 or 3 examples just to give you an understanding and to make you aware of this aspect. Let us talk about environmental impacts because emission is a major externality and is a major concern in the context of urban transport. So, obviously, we need to do something but if you want to study the environmental impact of transport system then you require a relatively microscopic view of the transport system.

Why? Because if we want to estimate a mission, we will require in that particular hour at not traffic is not same in different hours so a mission also cannot be same. So, in an given hour

you want to find out what is the mission, you want to find out then you need only traffic volume, you need also the speed because emission depends on that how much acceleration deceleration?

What is the speed? There are several factors which will influence the mission it depends on what level you were developing your model but some of these things were definitely required and you also required the vehicle composition. Because not every vehicle is you know will emit same it will vary depending on whether it is a petrol vehicle whether it is a diesel vehicle then whether it is a bigger one whether it is a smaller one.

Whether it is what Euro 3 or Euro 4 or Euro 2 you know different standards are there emission standards are there. So you need actually vehicle composition, you need hourly traffic volume you need the speed characteristics at that during that hour. So, fairly detailed level without that I cannot really work on the environment part I need at least that level of details.

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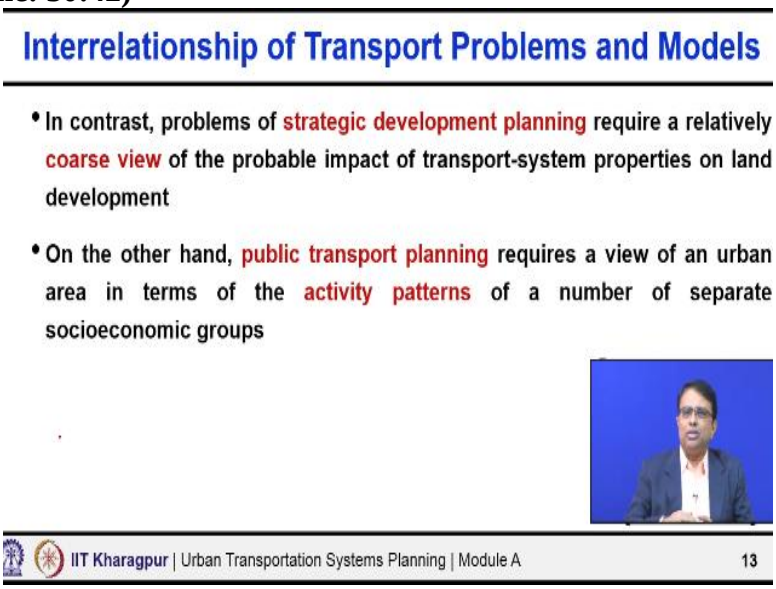

But if you then think you were actually working on strategic development planning that may require a relatively coarse view of the probable impact of the transport system properties on land development, how transport land-use and your actual there are very detailed model land-use transport is a very detailed model one can do. But I am saying it is such strategic development planning we are working at that level it is the strategic development planning not at a detailed level.

So, at strategic development planning, we really require relatively coarse view of the probable impact because it is not intended at that stage to go for much deeper. Let us take to another dimension, if you consider public transport planning for the city all are the necessity. We need to find out the strategic development planning we need public transport planning we need to do something for the emission.

But only I am trying to so the requirements are at different levels the depths are different so, your requirement of planning tool also will be different. So, if you want to do public transport planning, what you know how activities are distributed what are the kind of activity patterns that are observed. So, you accordingly the way people move you need to understand that then only accordingly you can provide your transportation service public transport system.

So that their, you know, they can do their activities while using public transport system to travel in between so that activity pattern very important. So you can see that the level and the requirements are very different for different types of transportation problem what we are facing today in our urban area. So, obviously we have to select model according to the requirement and according to the level.

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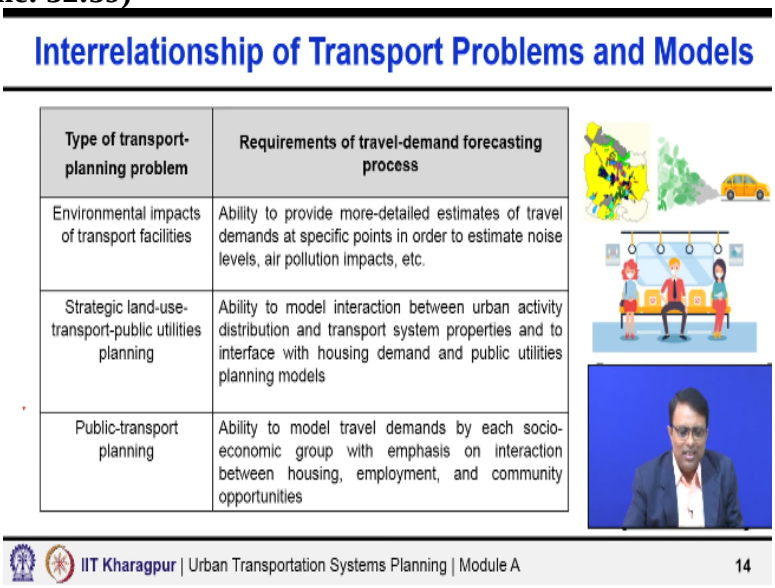

So in the last slide I have tried to summarize this taking example of 3 types of transportation problem as I said, first one is the environmental impact of transportation facilities. Then our requirements is basically our ability to provide more detailed estimates of travel demands that kind of model we require which will be which have ability to provide more detailed estimates

of travel demand at specific point in order to estimate the noise level or a you know air pollution level and so on.

On the other hand if we are doing say maybe strategic land-use transport public utilities planning then much grosser, much coarser level. So we need only a model which has the ability to model interaction between urban activity distribution and transport system properties and to interface with housing demand and public utilities planning models. So that that is kind of capability is required and which is at a coarser level.

If you come to the public transport planning then we need the ability to model travel demand by each socio-economic group high income low income everybody may not use bus. We also need to make the bus attractive to bring back the choice riders or the car owners to the bus system. We have to satisfy the requirement of the captive owners who captive riders who do not have the access to private vehicle also care for the marginally weaker section of the community and their travel.

So we need the travel demands by socio-economic group with emphasis on interaction between housing, employment and community opportunities. So the problems what we are facing today in terms of urban transport they are you know not similar problem they are different types of problem at different levels some require coarser treatment some require very detailed information. So we need to select models as per the requirement and the context so that is very important for us.

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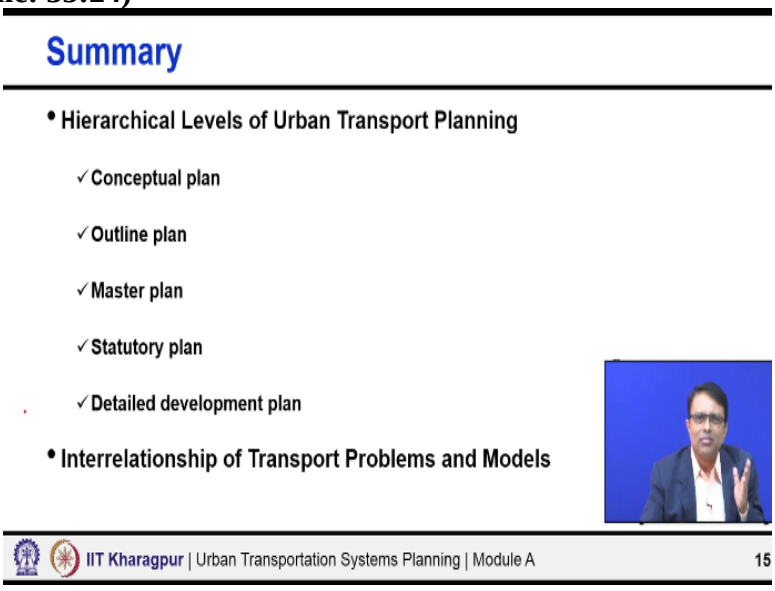

And with this I close this you know module A and this is the last lecture. Thank you so much.