Sustainable Transportation Systems
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Lecture 24
Transit Oriented Development (TOD)

Hello, friends. In the series of transportation planning related issues, you may recall last lecture we discussed about different aspects of zoning and how they are integrated with each other and how transportation systems help to connect different zones like commercial, residential and other facility related zones.

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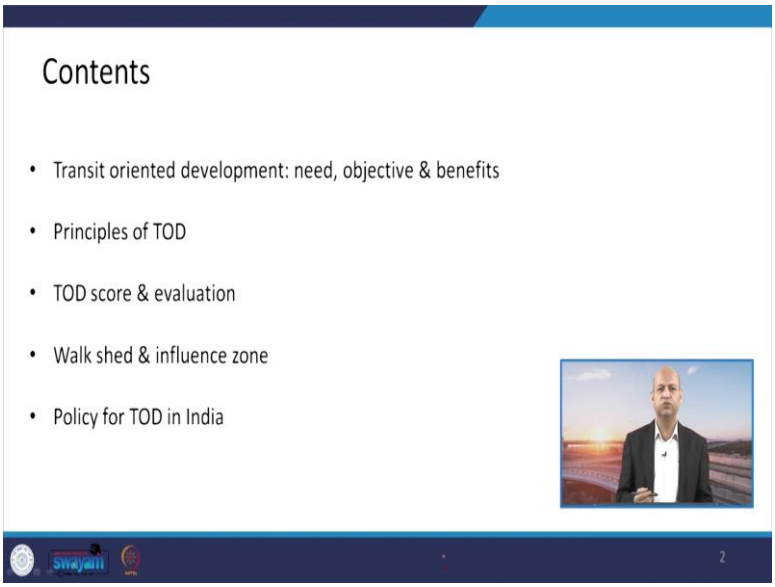

Now, today we will discuss about transit-oriented development. This is a completely, a particular focused approach, where we develop the urban areas in and around a transit system basically. So, in the contents of today's lecture, we will first discuss about the need of the transit-oriented development and what are the objectives and benefits we achieved through this TOD, that is transit oriented development.

What are the principles which really govern the TOD and different scores or evaluation methods for TOD, how do we evaluate, whether it is efficient or not, optimised or not, then walk sheds and influence zones which really help to promote the TOD, and the policies in India which are promoting TOD basically.

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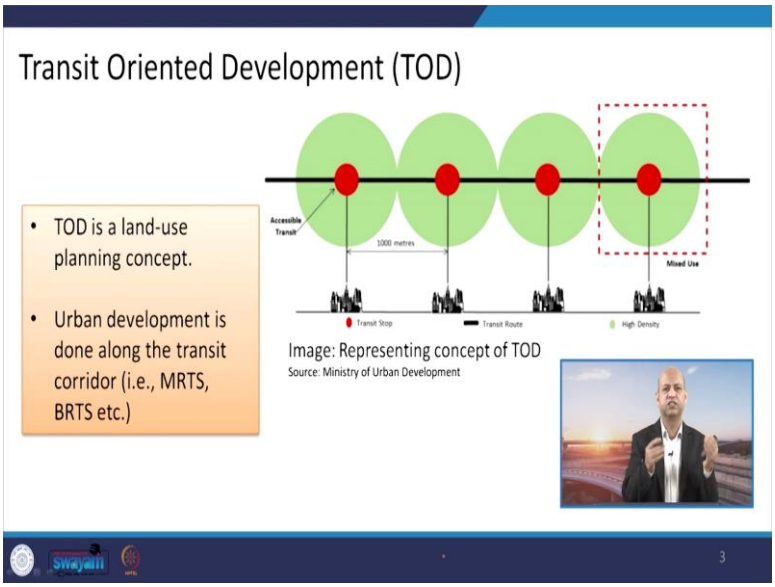

So, the transit-oriented development or TOD which is a basically land use planning concept for development of the city areas or urban centres. And it is kind of urban development along the transit corridors and transit corridors can be for example, BRTS, that is Bus Rapid Transit System or MRTS, Mass Rapid Transit System like metros, those kinds of things.

So, around those corridors of the transit or MRTS or BRTS facilities are developed, like commercial centres, employment centres, offices, and then parking related lots or then residential areas which are very compact and so, that these are more efficient to use. So, when we try to define the TOD that is the Transit-Oriented Development.

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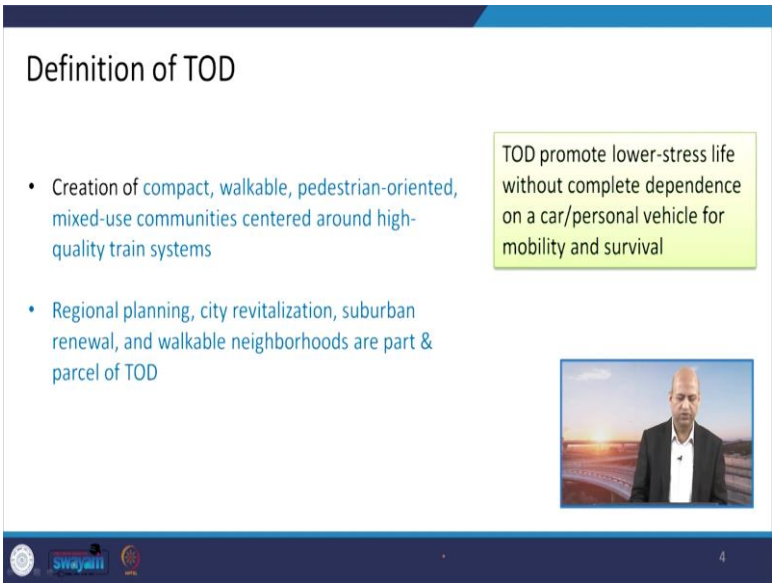

This is basically the system where, we really encourage the pedestrian and cycles related or non-motorised transportation system basically, and we discourage the privately owned automobiles or car dependence, so, that we can really remove much of the traffic from the roads and a lot of empty space is there for the movement and having the mobility through pedestrians or for cyclists etc. so, that it is a healthy way to live in that particular zone.

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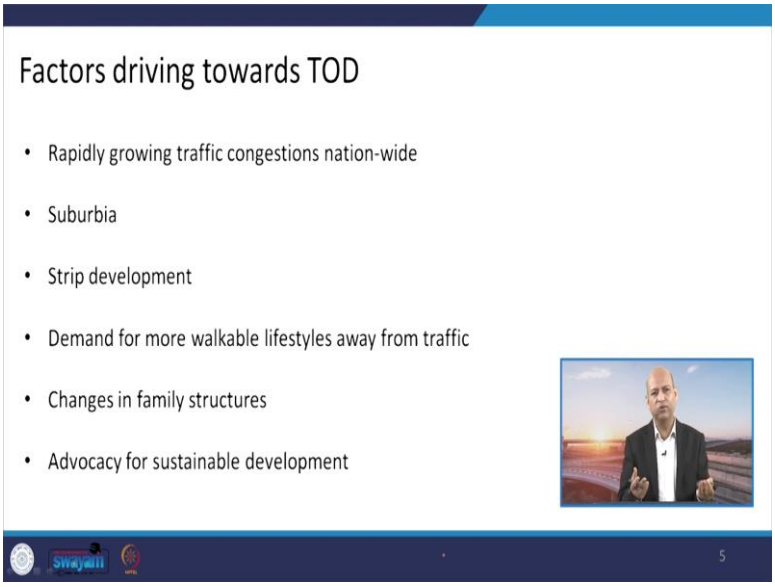

Well, then, there are different factors, which drive or boost the TOD and these are like, because there are so, many cases you see in all most all cities, that traffic congestion is a big problem. And it takes hours when you go to office or you go to your home from the office in the evening, when lot of traffic is there on a particular road and the speed of the car or automobile is very less and lot of fumes are generated, pollution, noise levels are created those kind of negative externalities we have.

So, these are the issues, which again, say that we should have some alternate way of the development and TOD is one of those good alternates. Then suburban like, everybody cannot live in the city centre. So, some satellite cities are developed to support a big city, those kind of suburban areas are also developed nearby to a city.

So, how to connect that again, either you have to have your own vehicle or you have to ride a public transport system like, then there are along the highways or roads, you might have seen sometimes, a lot of urban sprawls emerge. For example, if you have come towards Meerut and Haridwar from the Delhi, you can see lot of developments along the highway like Modinagar is completely on the highway, both sides, this kind of development, strip development, we call it that happens there.

So, this also needs to promote some sort of transportation system which can cater the needs of the transportation of those people which are living along those roads. Then there are like for demands of healthy ways like walking or healthy lifestyle based on cycle, non-motorised traffic those kind of things.

Then there are issues like family structures have changed from joint families to nuclear families and people tend to live in flats and this high-rise buildings are there. So, many people live in a particular building then it is difficult to have everybody their own cars because it will create lot of traffic jam in nearby areas. So, better to have public transportation system or transit oriented urban system.

Then there are advocacy for sustainable development and no doubt the mass rapid transit system or whatever public transportation system which takes hundreds and thousands of the passengers or people then it is always good to help the people to move towards sustainable development.

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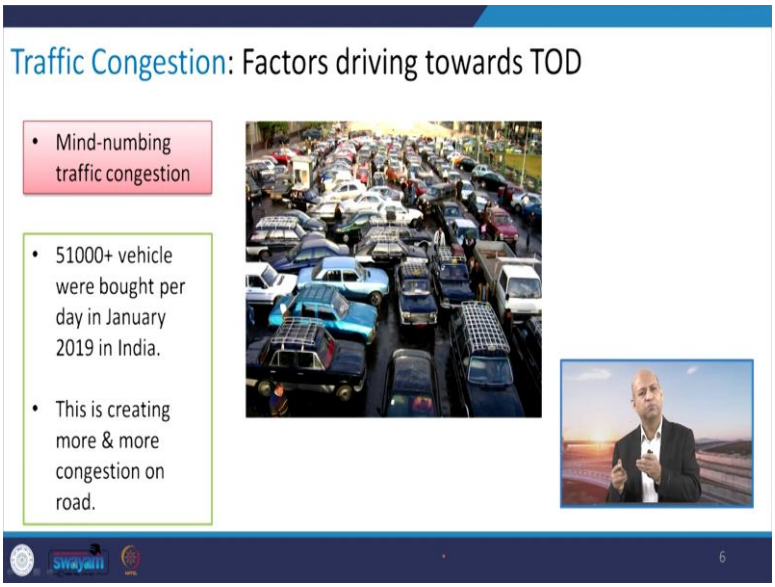

When one by one these factors if we see and discuss then you can see like this is the situation of the traffic jam or traffic congestion. So, these kind of situations where you can see some glaring data like 51,000 plus vehicles were bought per day in January in 2019, India. So, that way means how many vehicles are coming on the road, but in the proportion, we are not increasing the road width or road length, it is not possible.

So, again there is a need for other transportation systems which can create the space for people's journey. Then there are like these conditions also gives us food for thought that what

is the alternate system so, that we can reduce these kinds of situations, which are unhealthy in every aspect, in every respect, whether it is environmental or time related issue or cost related issue, and even stress like people feel a lot of stress when they do not reach to the destination within the given time frame. So, all those issues are there, which are very important.

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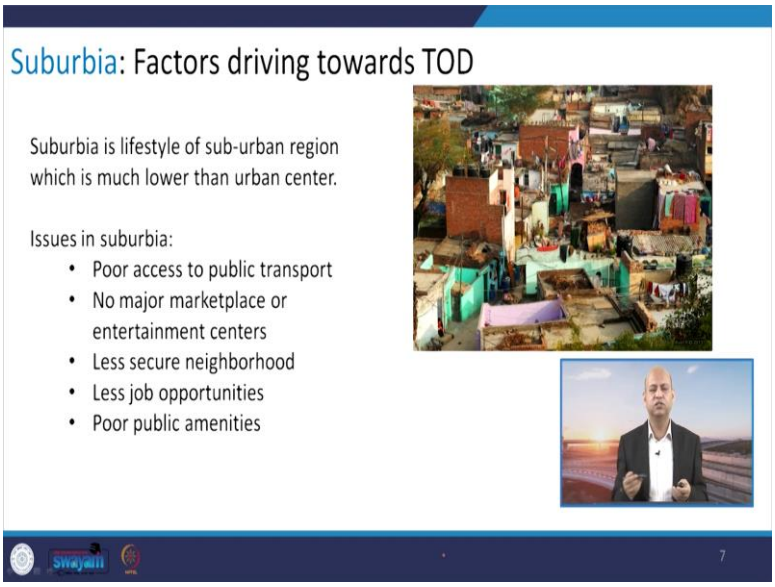

Then this culture suburban related culture, where poor accessibility to public transport system is there or then there are less job opportunities. So, people have to travel from suburban areas to the city centres or industrial areas or industrial clusters. So, they need again some way to transport or to move or go from one place to another. So, again these TODs or transit-oriented development can help them to reach to the employment related places.

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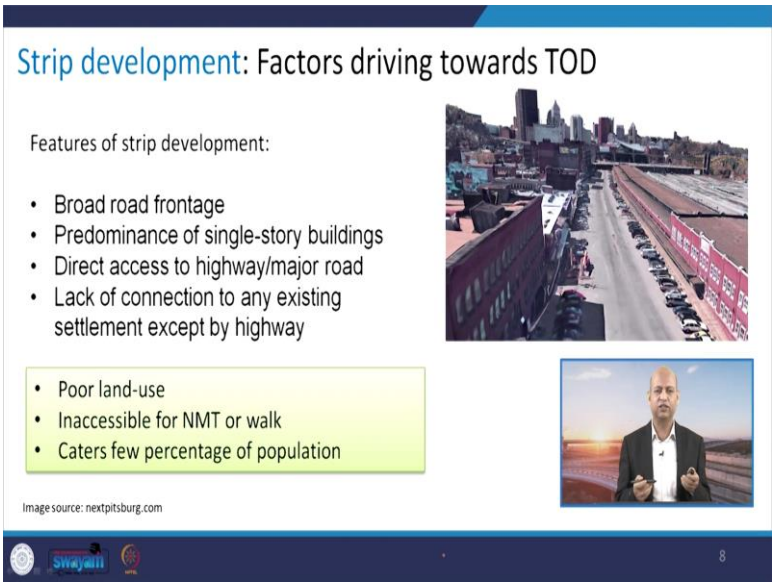

Plus, as we discussed briefly strip development where horizontal developments occur sometimes near to the highway and everybody then have some sort of car or other vehicle so, that they can reach to the destination because there is no public transportation system. So, along that if we can have this transit means Bus Rapid Transit System or MRTS, it can really help people to shift from privately owned vehicle to the public transportation system provided, we can interconnect them like, we can provide some parking spaces if they are coming from farther area.

Otherwise, if within the 1 kilometre or 500 metre or so, distances people can walk also and they can also have some last mile connectivity through three wheelers or cycle rickshaw or even cycles related facilities. So, this is the poor land use and inaccessible for the walking and non-motorised transport, which again gives us an idea that we should promote the TOD or Transit-Oriented System.

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Then for healthy lifestyle because safety issues are there, when we are walking or having cycles through traffic accidents avoided if there are no cars or, fast moving vehicles, then it is good that we will not have such accidents or they are having health benefits also when we are walking. So, health benefits are there because we are doing a kind of physical exercise.

Then there are environmental benefits because there is no emission or air pollution related issues. Then there are transportation benefits because, from one place to another, there are shorter distances so, you do not need other kinds of transportation modes, economic benefits because it is cheap to walk or to have using cycle you do not need to pay for fuel etcetera.

Then reduction in traffic congestion and then transportation equity means everybody can walk. It is nothing like it can favour a particular community or class because like if it is something which is favouring car ride that means we are favouring people who can afford to buy car so, that is not good, that is not equitable society.

But for like walking or cycling, this is equitable anybody can use and in developed countries, we have given some examples like in Netherlands 70 % people, 80 % people in a particular city they are using cycle or they are walking, even if they are rich, this is culture, they are nothing like some kind of a stigma that why he or she is using car even if that person is millionaire or billionaire. It is nothing linked with the class or prestige issue like many people think in developing countries.

Then it also promotes active lifestyle because you are agile, you are quite fit and active, and you are doing physical activities otherwise, this always if you are in your AC room and then you are in AC car, then you go AC office, those kind of lifestyle does not give you better feeling in terms of physical energy.

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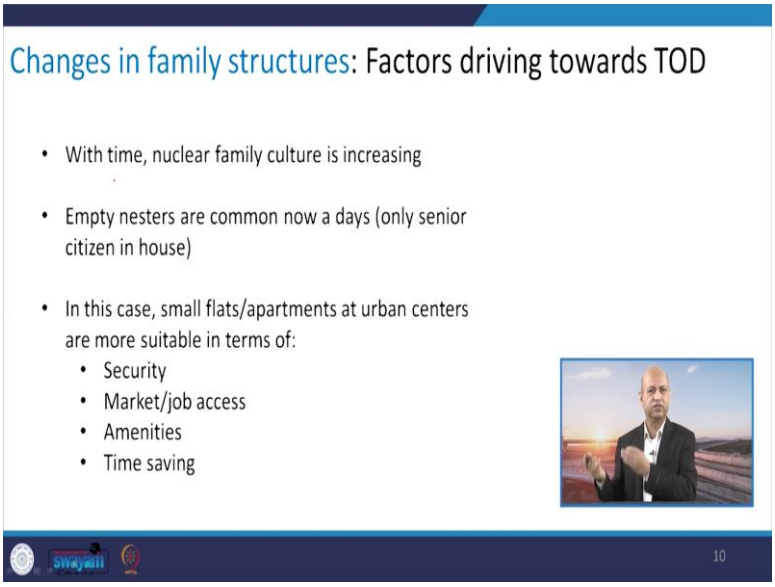

Well as we discussed very briefly earlier that this family structure which has shifted from joint family to the nuclear family, so, the nuclear families have incentive to live in small flats those kind of dwelling units. So, high rise buildings are coming up because then they can be nearer to some transit-oriented system where they can have the public transportation system and they can reach easily to the commercial centre or to shopping centre or to offices those kinds of issues can easily be tackled.

In joint families people used to live in big houses and far away from the, the landmass which is very expensive, otherwise, you cannot have the large space, flats are compact and they are cheaper in comparison to the independent houses. So, these kind of family structure have also given boost to this transit-oriented development.

Because when people are living together in big number then it does not make any sense that everybody is having car and then moving and wasting a lot of time in congestion etc., better to have some sort of interconnected transit-oriented systems so, that they can go to the bus stop or to the metro station easily by walking or by using some last mile connecting, connecting means and they can use those transit systems.

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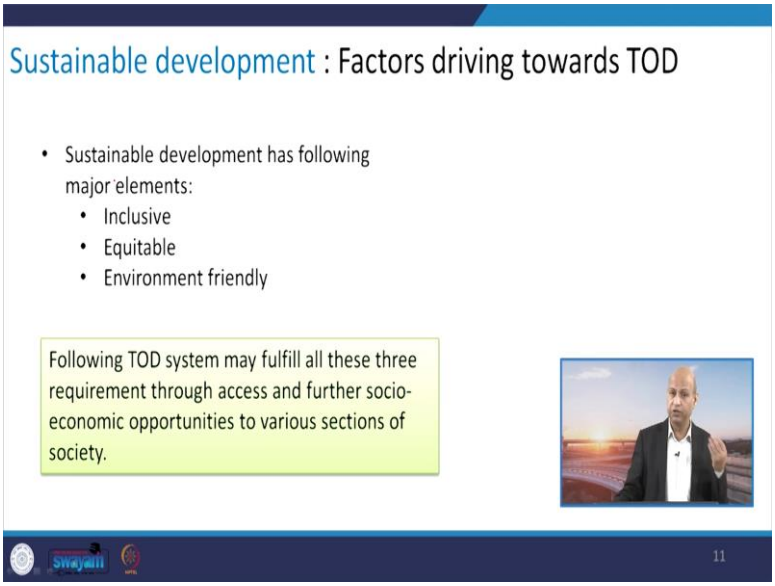

Then there are sustainable development issues, which we always discuss like the inclusive society is favoured by transit-oriented development or these mass rapid transport systems because people are interacting with each other and the same facility they are using, even if you are rich or poor or middle class, it does not make any difference, the same coach of the metro you will here, same bus you will see here.

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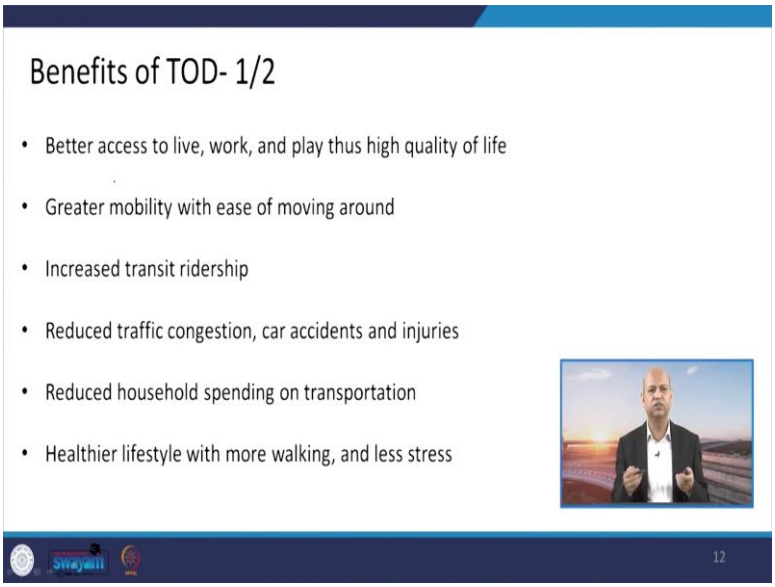

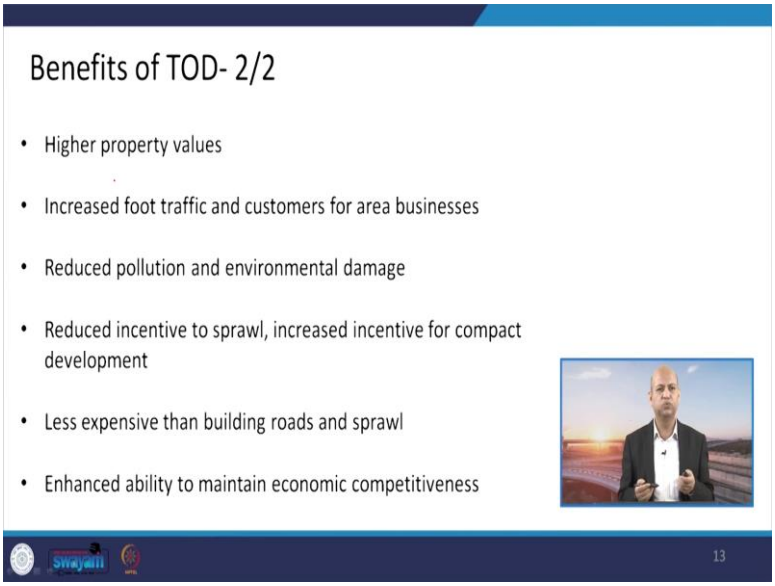

So, this is inclusive, it really help people to intermingle and feel connected, better connected, equitable also in that sense, and then environment friendly, it is less emissions per kilometre journey or so. These are the benefits then if you count benefits in that sense, again, I do not want to repeat but those are the benefits which are related to lifestyle and the increase the ridership.

And then reducing traffic congestion, all those issues are there and having the health benefits and then less expensive than building roads and sprawls because once you have developed a particular mass transit system, it will go on for decades, and you do not need to build or construct additional roads etcetera. So, that way, it is very sensible and very sustainable from economic and environmental viewpoint.

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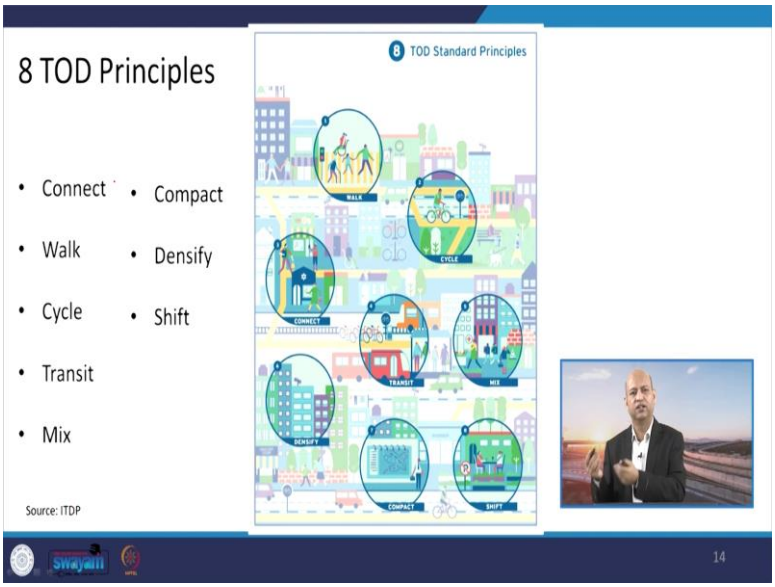

Then if we think about different principles, which are favouring the transit-oriented development, so, these are like connect with each other means it really connects and compact developments and then walking sheds or walkability and the densely populated areas and then cycle related facilities and those tracks and shifting from one mode to a better mode means privately owned to public transportation system, and then this transit system and then mix usage of different facilities.

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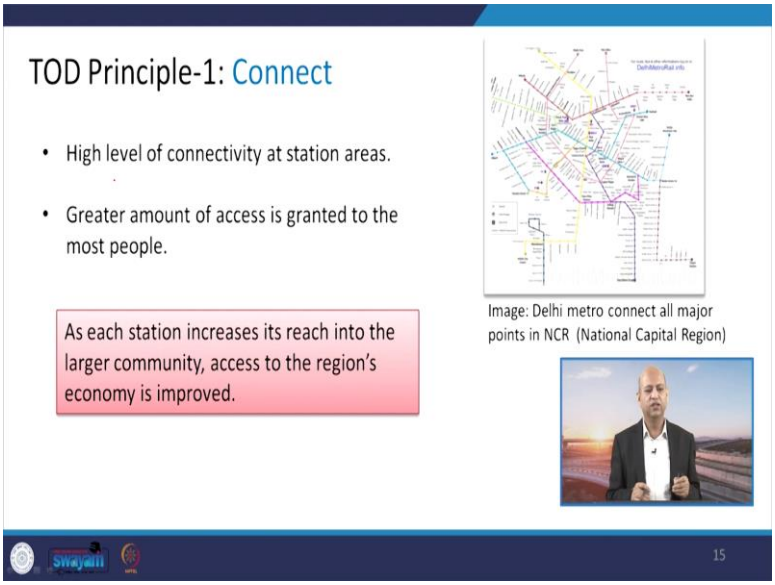

So, if we discuss about this first principle, that is the connecting, so that means, this connects people with each other and it also connects the spaces because this transit-oriented developments always develop nearby ancillary kind of facilities.

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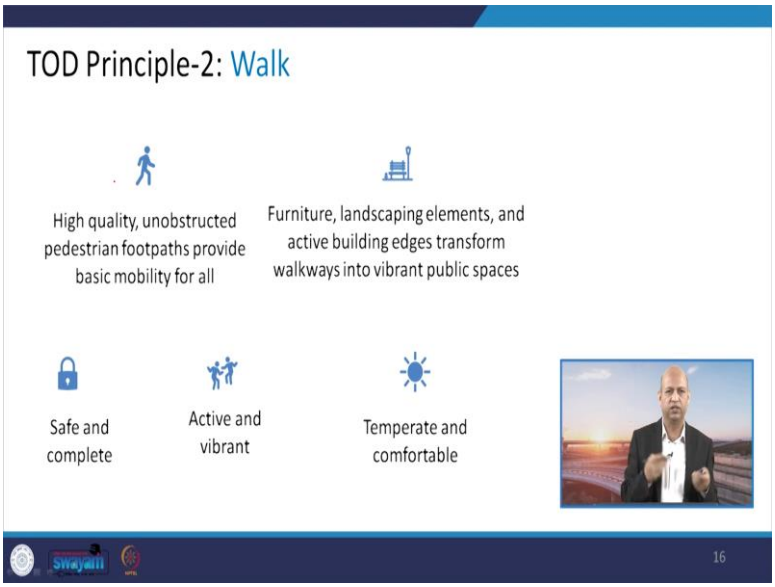

Then people tend to walk because nearby spaces they occupy in terms of offices or residential areas. So, they feel incentive to walk, why should we, when you go to the parking and take your car, within that amount of time almost you can reach to the destination. So, it is always better to walk and you feel good also active and energetic.

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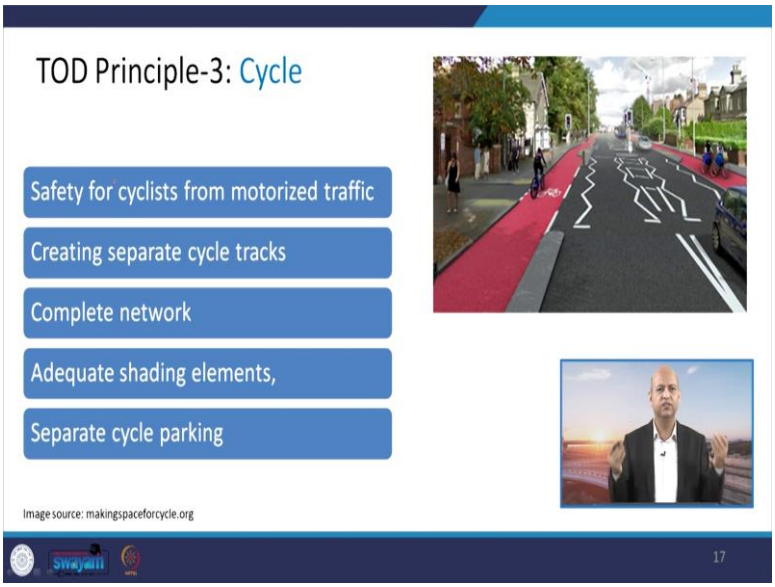

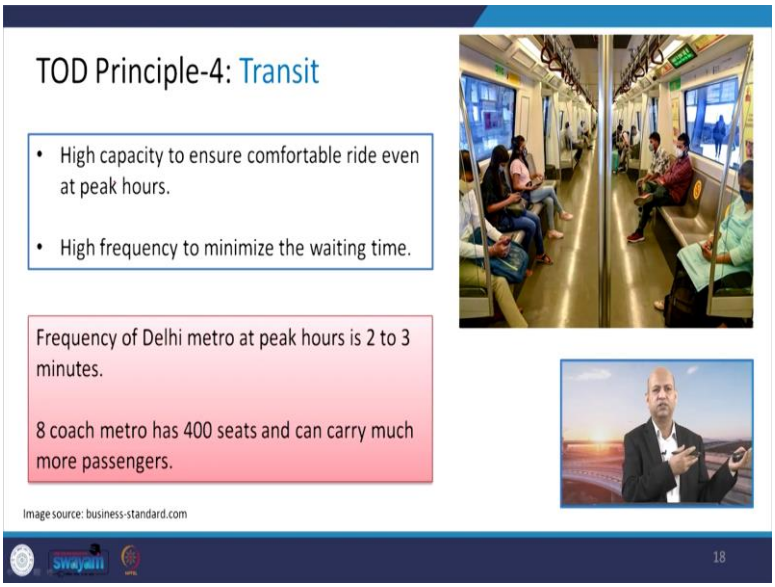

Similarly means if you have certain facilities like dedicated tracks for cycling, etc. so, it is safe, it is also again, feeling good, physically active. So, you can use cycling also. These principles are there means you have to have those things if you want to promote TOD system otherwise, you cannot means these walkability spaces must be there, cycling spaces must be, there then transit, which is like BRTS or MRTS means that should be a very good facility, so that people feel comfortable when they are moving from one place to another.

And they are also high capacity plus good frequency, so that people do not feel to wait for hours or so, otherwise, they will feel discouraged. So, like for example, if we give the example of Delhi Metro in peak hours, there is only 2 to 3 minutes waiting period. So, frequency is quite good. And then long coaches are there, number of coaches, can meet the demands of the peak hours that and comfortable journey.

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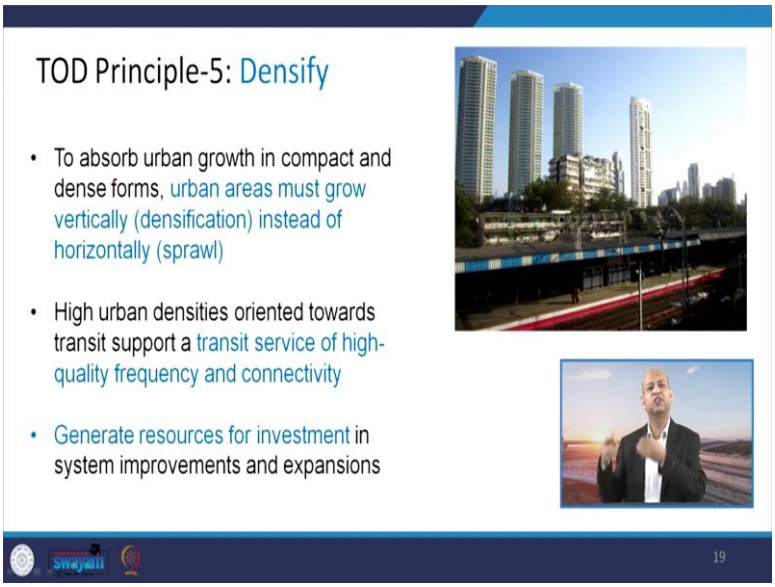

Then densify means the densely populated cities in the skyscrapers or high-rise buildings, this is also again helping in compact living and compact working kinds of things. So that it can discourage the horizontal sprawl or horizontal expansion of the people and it can save lot of land space for parking area for other activities, recreation areas, when you grow vertically.

Otherwise, if the same population which is living in a high tower building, if you want to create independent houses, it will require several kilometres of the land, which is not possible it is very expensive in urban cities and does not make sense. So, those kind of densely populated areas are also part of these kinds of TOD related developments.

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Then compact means different facilities are packed together, whether it is educational related, schools and then commercial centres, residential areas. So, they are interconnected in such a way that people can easily access those areas by either walking or by simple cycling. And if you are going for let us say university, then it should be again connected to the metro or to the BRTS that way.

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So, it is always good for having these kind of mix uses. So, that at a single point, you can have several kinds of facilities and you do not need to go from one place to another to meet another kind of demand or another kind of services which you seek. So, if multiple activities are going on in different pockets, so people can meet their demands in those pockets.

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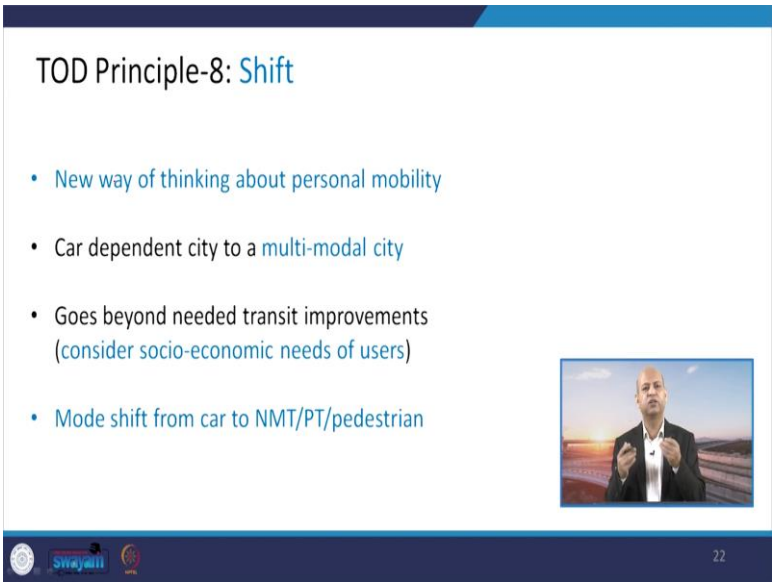

And then the shifting, the eighth principle means shifting from the privately owned this mobility to the public transportation system or multimodal city kind of thing and promoting this non-motorised transport or public transportation or pedestrian related walkability from the car. So, that is the shift which really this TOD helps to orient our lifestyle.

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Then the city centres or urban centres example of transit-oriented development you can see like parking facility or offices or open spaces or non-motorised related these kinds of tracks etc., how they are properly planned. So, these kinds of things you can see or high frequency transit, then pedestrian related bridges etcetera, they are planned in such a way that people feel good about walking and using non-motorised vehicles besides using this public transportation system based on TOD.

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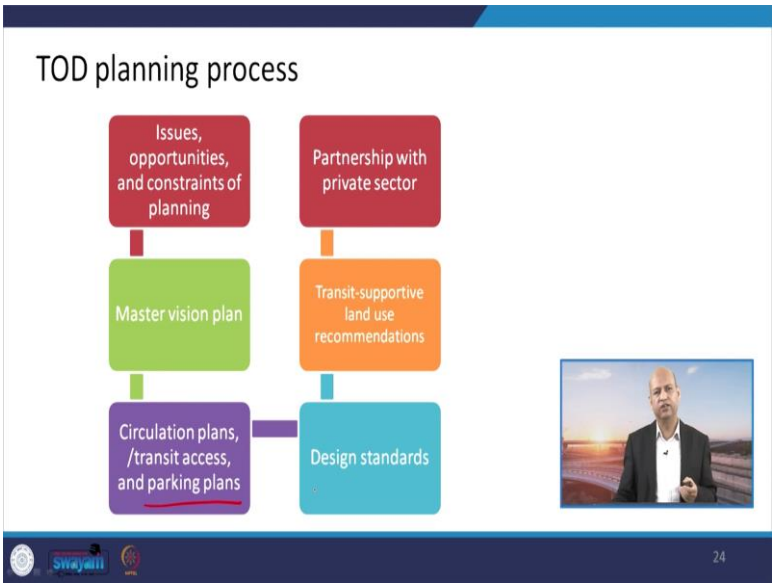

Then if we want to go for the process, how to achieve this planning, which is based on transit-oriented development. So, again like issues and opportunities depending upon city character and the constraints like suppose a particular heritage building is there and it is occupying large space. So, you cannot, have MRTS across that either you go underground or something like that means there may be some constraints.

Then this master vision plan, which can help, which kind of facility is coming after 10 years, so whether this facility will be able to be connected by this public transportation system or not. Then the access to the transit system and the parking plans so that people can easily park there, these cycles etc. bikes and they can ride to the BRTS or MRTS.

Design standards, then transit supportive land use and land planning related issues or recommendations and the partnership with the private sector because every project if you feel that only government can support, then the speed of the development will be quite less. So, it is better to incentivize the private or private capital to invest and they can also make some profit and these infrastructure which are supporting the TOD they can be developed very quickly. So, shared partnership really helps in these kinds of developments.

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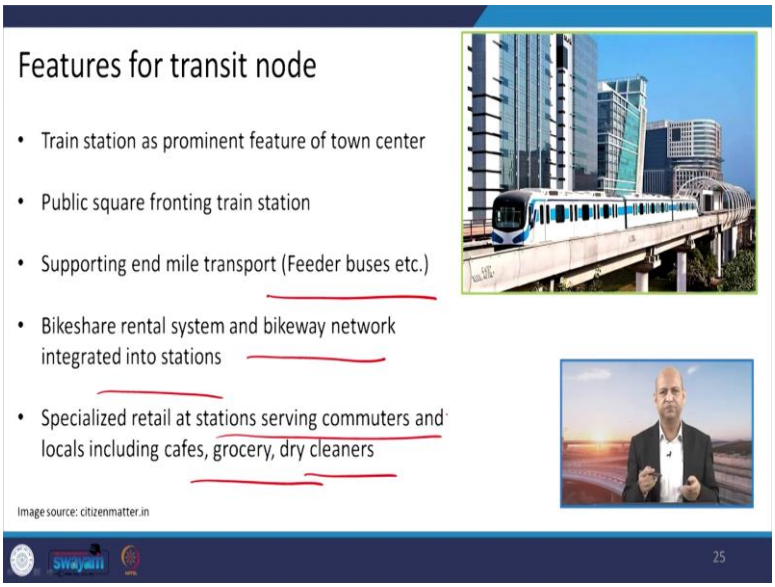

If we talk about different features for the transit node, then we see like train station, at a particular centre, and then feeder buses, those last mile connectivity related issues, and then bikeways or integrated systems with the stations and then grocery, drycleaners or those related services which are near to the residential areas and in between which people can, when they are going to one place to another, they can also use that opportunity for their services.

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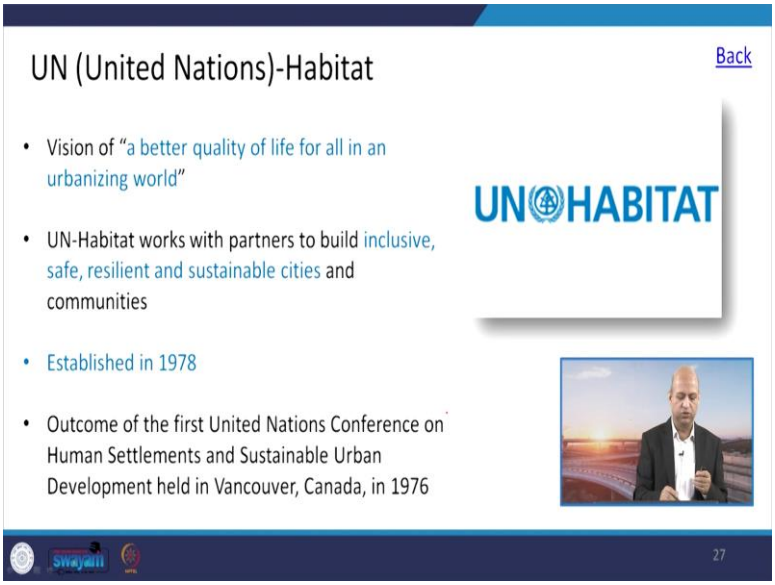

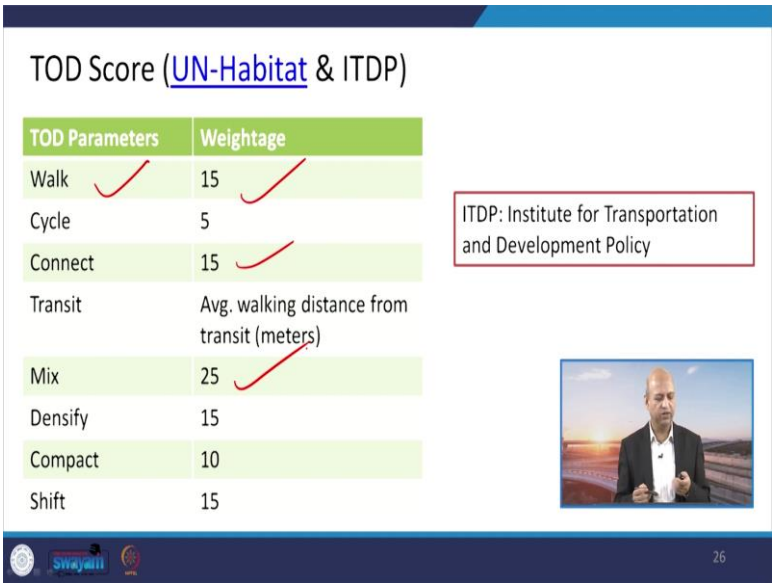

Well, UN habitat related guidelines are there based on their vision, which is better quality life for all in an urbanised world, this was the vision statement of the UN habitat, this one organ of the United Nations and they are promoting, this TOD. And they have given different score system or weightage system to promote like, if if it is supporting walkability then it is 15 % weightage, for cycling 5 %, connecting with each other 15 and mix 25 those kinds of things. And ultimately, this can be seen as per policy issues, which were developed by Institute for Transportation and Development Policy.

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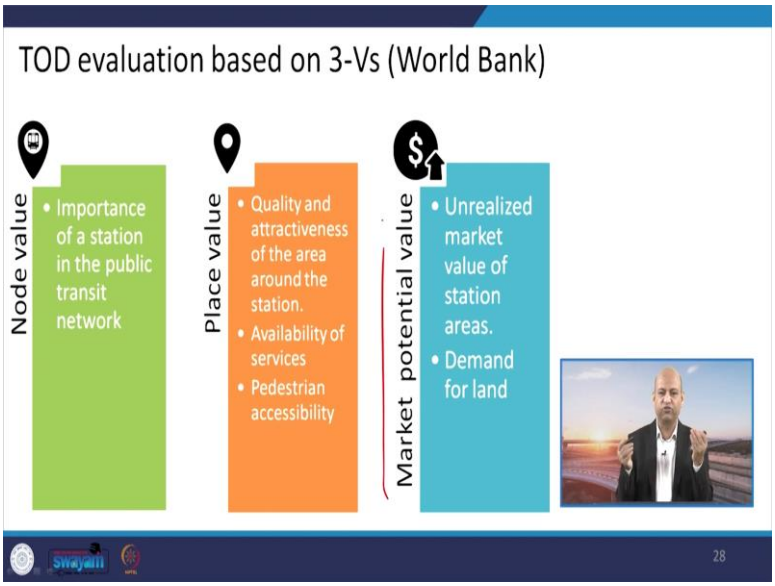

So, there are other guidelines or some principles which are based from World Bank documents also like 3V's are there one is node related value and then place related value. So,

in node related value, the importance of the station in terms of the public transit network, how they are connecting that will be seen.

In place related value means, how many facilities or availability of different kinds of services including the pedestrian's accessibility, how they are interconnected, that will be seen. Then market potential rated values which is seen like demand for the land or if there is any unrealized potential for the marketing of some things, which can be really connected with this system. So, all these things have to be seen.

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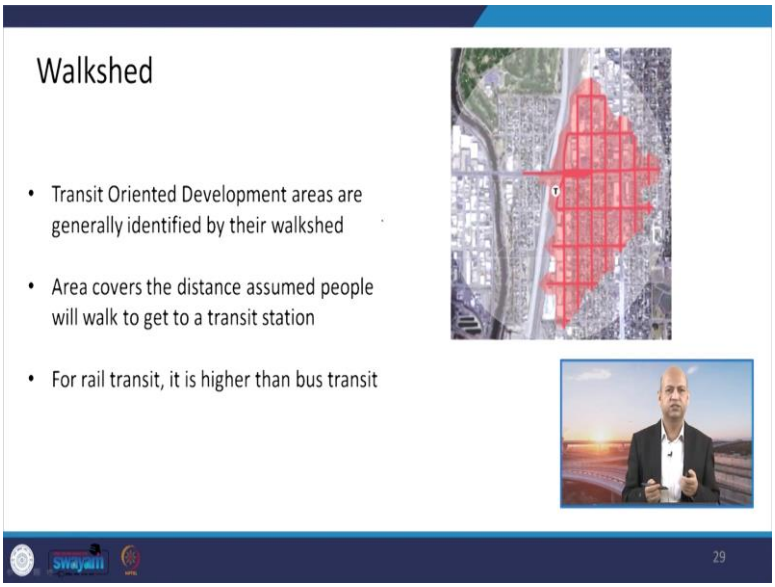

Then there is concept of walk shed like you have heard the watershed, urban shed. So, similarly, walk shed concept is there that means, the area which can really people feel without any negative feeling, they can walk for accessing the public transportation system. So, different communities, different countries, different people have this different, this walk shed.

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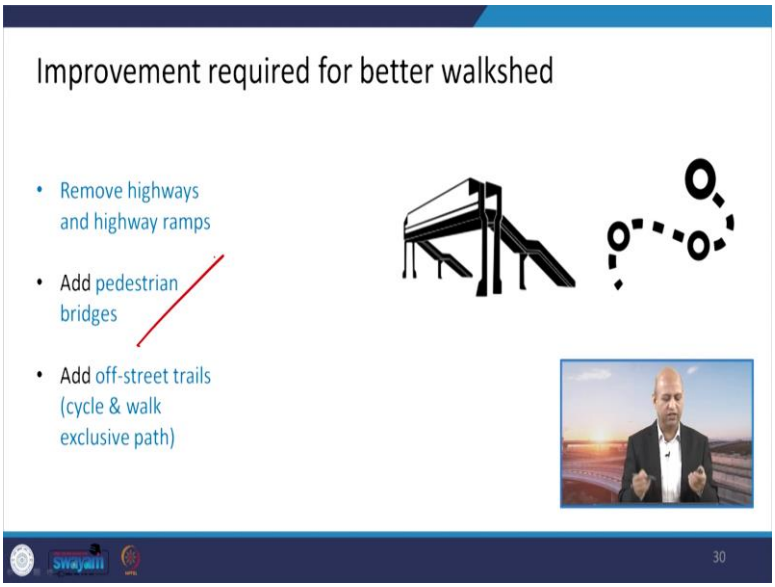

For example, you know, some people based on services they say that 500 to 800 metre people can easily walk in certain areas. So, for that, you have to provide like pedestrian bridges, and if there are highways, then you have to provide either subways etcetera, so, that people can walk and access those facilities which are related to TOD.

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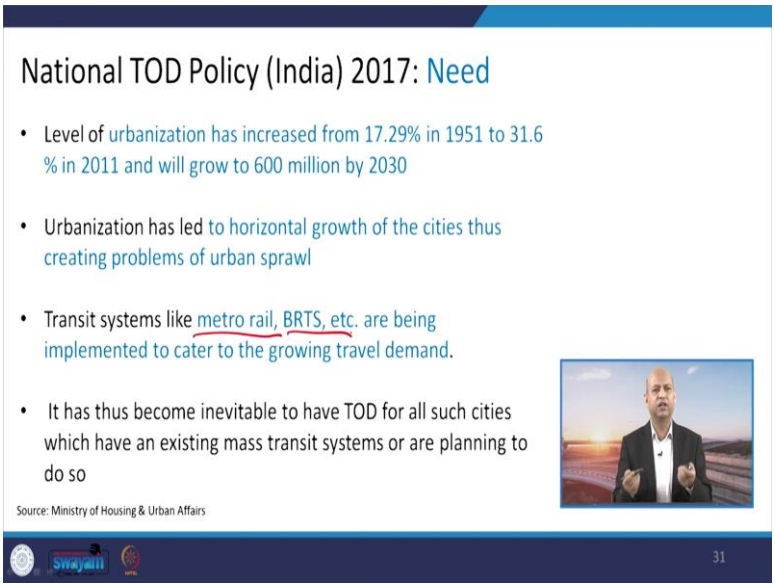

Then there is this policy in India in 2017, it was brought in national TOD policy to promote transit-oriented development. So, you can see like, in 1951, this urbanisation has increased from 17 % in 1951 to around 32 % in 2011. That means, growth is having quite fast from urbanised population point of view. So, the 600 million people by 2030 are going to have these kinds of needs of transportation systems.

Well, so, the horizontal growth to reduce and to go for this transit development or transit-oriented development, this policy is there for promoting metro rail or BRTS. And in several cities now, you can see in Jaipur, in Lucknow or Ahmedabad and all cities are coming, they are asking for these kinds of systems so that they can really meet the public transportation demands or needs.

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And the vision which is based on like enabling transformation from this privately owned vehicle mobility to the public transport related development. And then accessibility for the public transportation, easy accessibility, so, that people feel incentive or encouraged. And the compact walkable communities in and around those TODs so, that people can easily move and they can access easily those TODs or transit-oriented systems.

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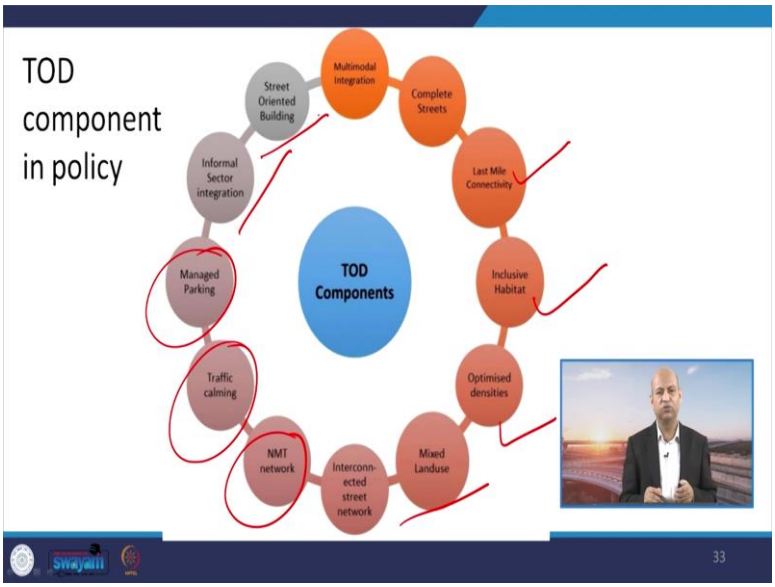

When we see different components in nutshell, then like, these are the issues like last mile connectivity, all these aspects have to be properly addressed, if you want to promote TOD. Otherwise, it will not be means it will fail, if some components are not addressed properly, timely, then this TOD related development will not be seen in future.

Otherwise, it will be meeting like highly costly and for example, in certain locations, sometimes you find that metro is completely vacant. So, that means, there are certain components which have not been properly addressed, otherwise people should write, should take those metro services, why they are not taking.

Maybe it is not properly accessible, maybe it is not going through densely populated areas, it is just going through very thin populated areas those kinds of issues, inclusive habitat and then optimised densities and the mixed land use and the this NMT network, non-motorised transportation.

All these management of the parking lots and traffic calming related policies must be there, otherwise traffic congestion if we just do not address those issues then nobody will move from privately owned cars. Then informal sector integration is street-oriented buildings so that people can walk in those streets.

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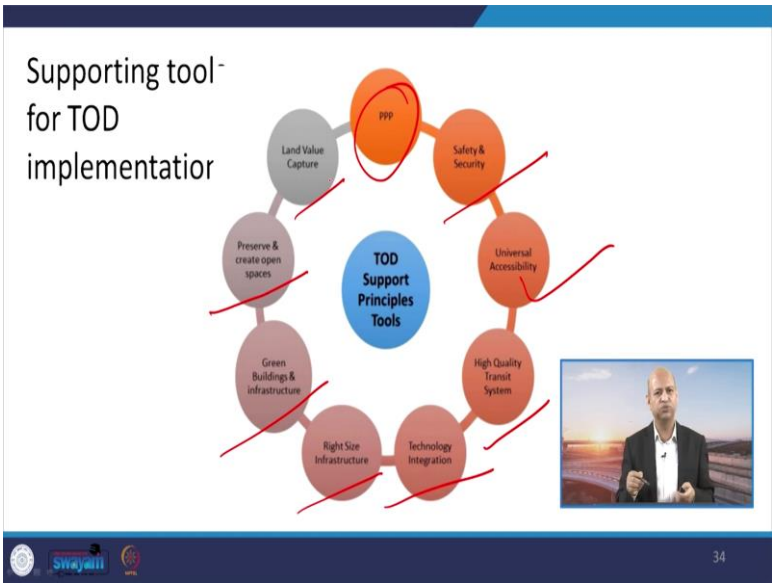

And like supporting tools to implement when we have planned the TOD then how to implement what are the supporting tools which are needed so PPP, Public Private Partnership that is very, very important to boost the TOD system otherwise lot of money is required for developing these metros or BRTS etc. Safety and security related issues are there. So properly if we implement and we address these issues then it always favoured the TOD.

Similarly universal accessibility, if we are determined that every person of our city, of our town must have good accessibility to the transportation system, then it is always good for the TOD related development, high quality transit system again, as I said, if journey is comfortable then people will feel incentive to go otherwise, if it is completely packed and you are not feeling good, second time you will feel hesitant to go to that particular system.

Technology integration again, modern technology and like digital technology you can get on your mobile that this is the time I can reach to my station and I can take the next metro and so, like that. Right size infrastructure as because if it is not right size, lot of people will be there on the station and it will be a big crowd. So, that means, it should meet the frequency and the number of coaches, all those things, those infrastructure have to be of the right size.

Then green buildings and infrastructure when we promote then TOD health because lot of space is there, lot of greenery we can afford to promote. Then preserve and create open spaces as I said, when you are going vertical growth, a lot of open space you can afford to convert into recreational, parks and playing grounds etc., land value capture all those issues are helping the TOD.

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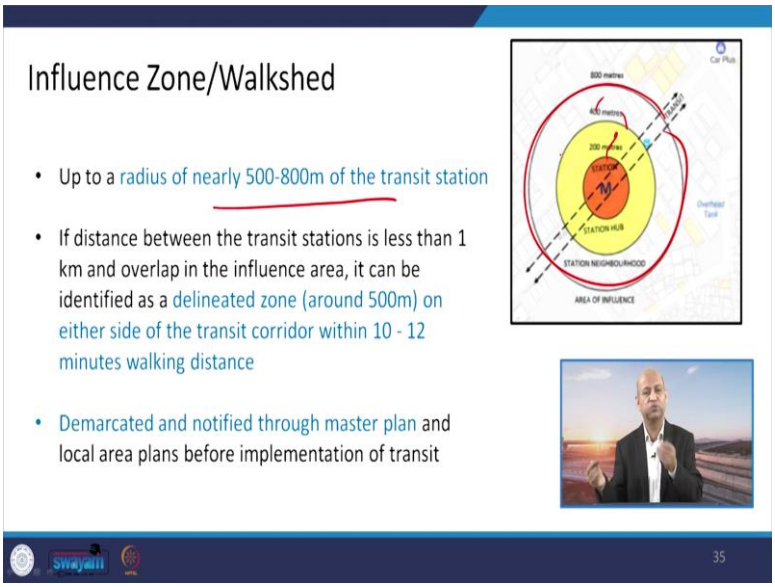

Then the influencing zones of the walk shed as I said that there are different surveys and they say that 500 to 800 metre if we have these issues around the station like 200 metre, 400 metre, 800 so, this kind of circle people can easily walk and beyond that people should have some other way to reach their destination.

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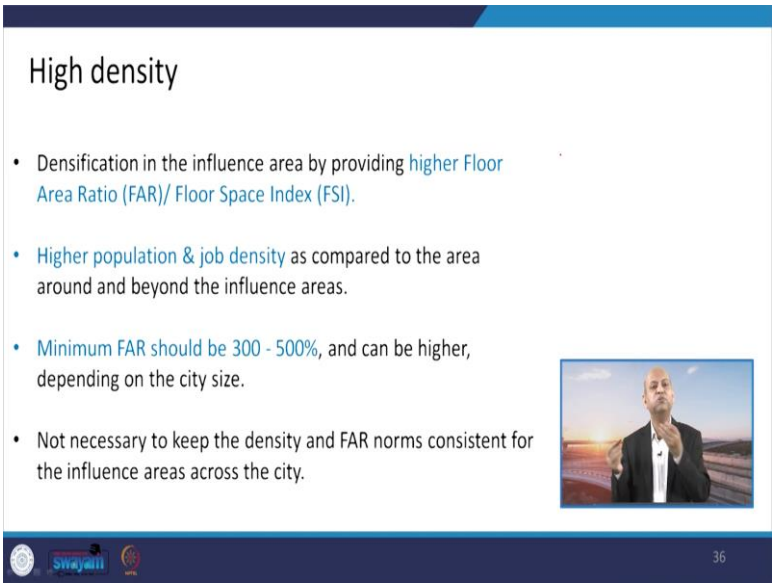

And high density always help to people nearer to these metro stations etc., because people want to live nearer to that so that timely, they can catch the metro, they can go to the office and they can come back timely.

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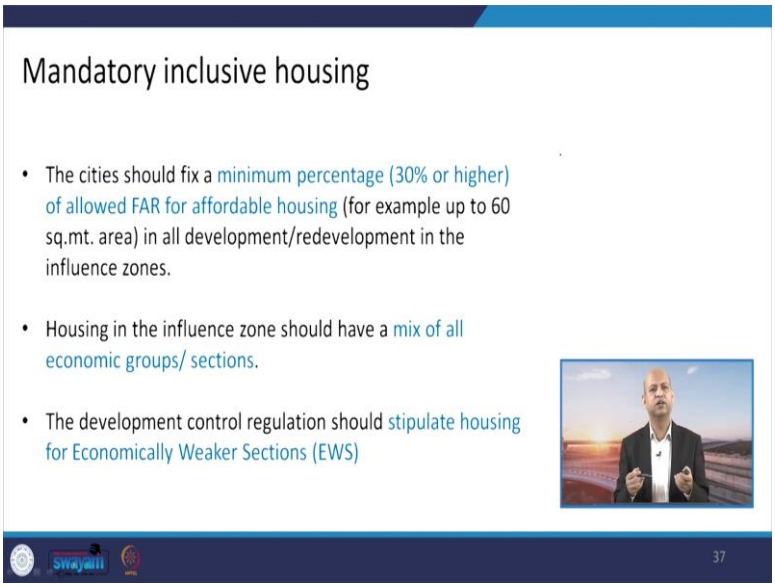

Similarly, then there are issues of the like housing because inclusive growth-related issues we can address by making some percentage mandatory for middle class, for poor class, so that way we can address that in a particular locality so, many means all kinds of people can live and that also helps in different kinds of services like for car washing, some lower income group, they can have additional jobs. So, in that locality also, so, this is really helpful to them.

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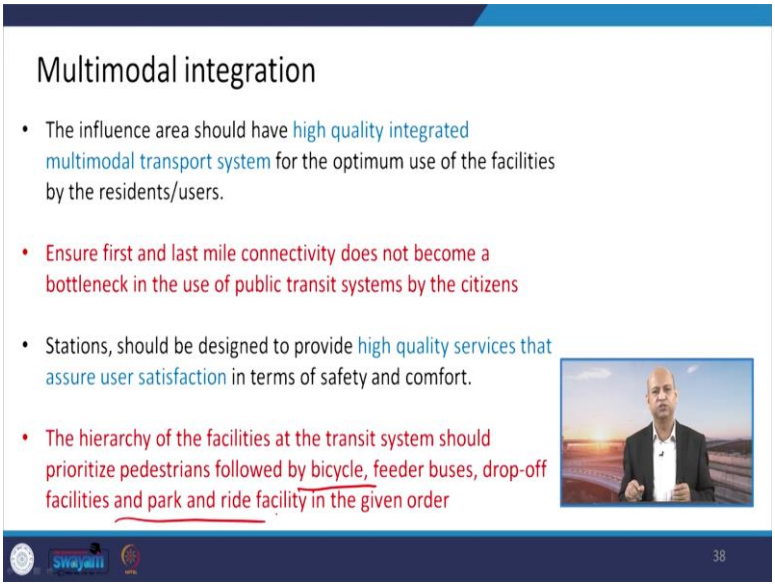

Then multimodal integration, because it can ensure the last mile connectivity through multimodal integration otherwise, if you are just investing in a particular kind of transportation system, if you do not promote the multi, multimodal systems like non-motorised or last mile connectivity related three wheelers or city buses or small kind of buses,

then it will be a difficult scenario for people. Then there may be like bicycle related path or some parking related issues, all those things you have to really generate, so, that multimodal integration can take place smoothly.

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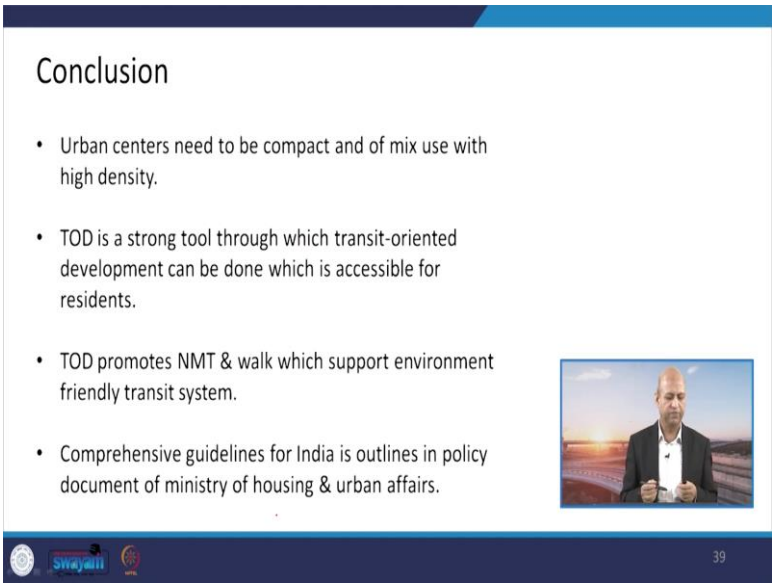

So, in conclusion, we can say that urban centres of modern era, they need this transit-oriented development, vision and philosophy, because of several reasons, which are related to the cost, transportation cost, as well as environmental related issues, because it helps us to have larger open spaces, it also helps us to reach our offices timely, and it does not require us to have our own car and those few related issues, and transportation cost related issues.

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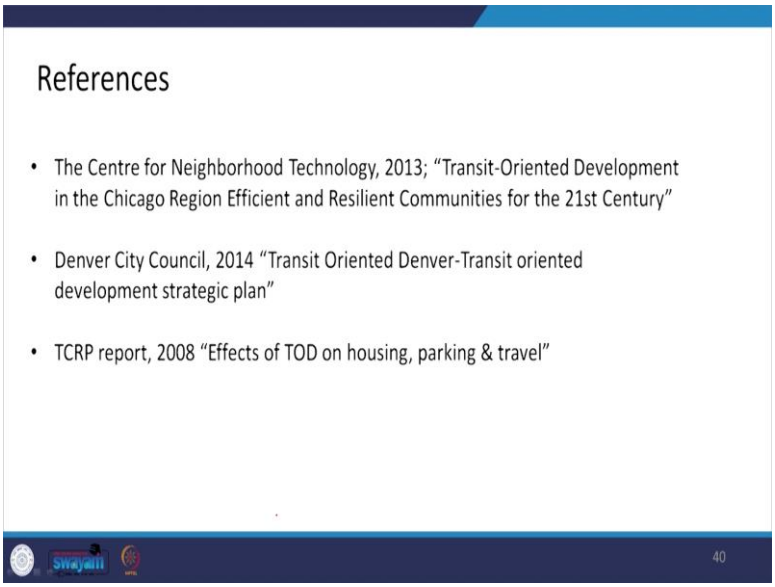

So, to promote, TOD and NMT or integrating, all those things are the need of the hour. So, that is all for today's lecture through this transit-oriented development, which you can see, you can visualise in different cities in and around your location. So, these are the references for TOD related issues, you can go through them for additional information. And thank you for your kind attention. And let us meet again next time. Thank you.