Introduction to Multimodal Urban Transportation Systems (MUTS)
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Module No # 03
Lecture No # 11
Public Transportation: Financing Public Transportation

Welcome friends. We welcome you to the next lecture in the series of bus transportation. We have looked at how bus transportation planning is done. Now let us look at some of the financial aspect in bus transportation.

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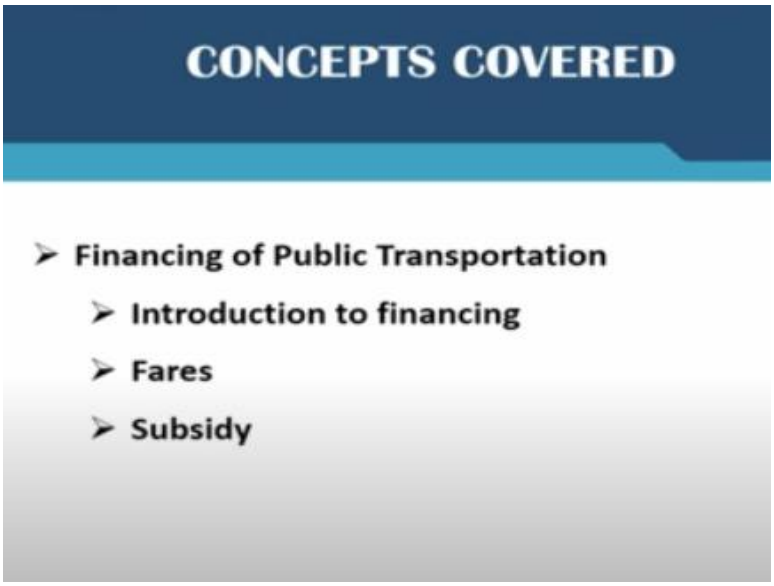

Fares are one of the very important things when you are determining the viability of any public transportation system, and so is subsidy. So in this lecture we will introduce you to the different types of financing schemes that are used in order to determine fares and subsidy in a sustainable fashion.

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So when we are talking about any public transportation system it is always understood that it has to maintain certain quality of service or certain performance, for which it has to have enough financial resources. Now financial resources have always been tight in case of public transportation, especially because of the reason that the fares that are charged for public transportation do not always cover for their capital costs or maintenance/operation of these public transportation system.

On the other hand, since they are a public transportation facility, i.e. meant for the masses, the fares have to be kept reasonably under control. So how do we balance these 2 factors in order to have a sustainable public transportation system in your city -- that is how we are going to approach this lecture.

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Fares contribute the single largest source of finance for any transit company. There are other ways of collecting revenues as well, that is through either advertising or through renting of spaces for different types of other uses such as public buses are sometimes given for private special events, for eg. if you have large sporting event in your city, you may see that the public buses are rented to get people from their stadium to different parts of the city.

So those are other ways of generating revenues, however the operators are mostly dependent upon on the fares that are collected every day from the operations of the public transport system.

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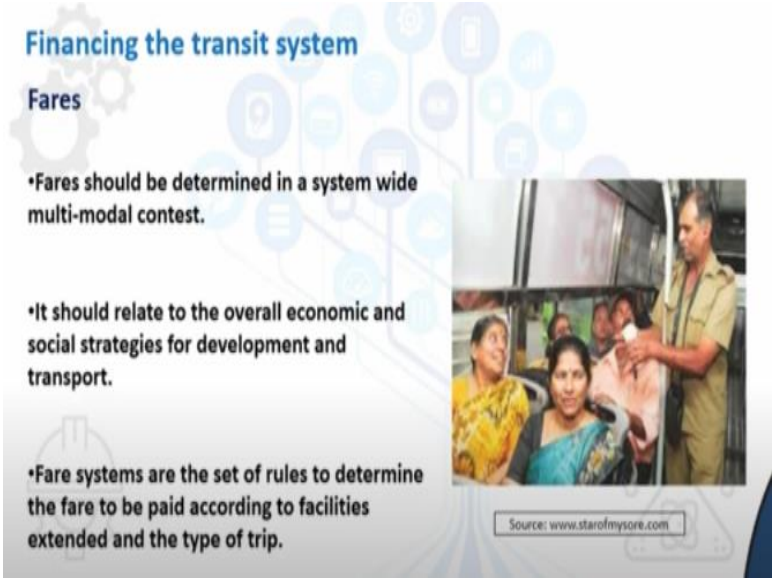

Now fare should be determined in a system with a multi modal context, i.e. it should also relate to the overall economic and social strategies for the development of transport. And fares are determined according to the facilities extended and the type of the trip. It means that if you have 2 different types of services available, or public transport system service in your city, although both of them may be taking the person from point A to point B, which is the same distance, but if the services are of different types, you will be able to charge different fares. For example, any 2 different types of buses may be operating on the same route. One may be air conditioned bus and one may be regular bus, both will take you to your destination most likely in the same amount of time.

But the services that are offered by an air conditioned bus is higher than what the service or quality of service by a regular bus and hence the fare would be higher. So that is what is meant by how a fare structure should be determined.

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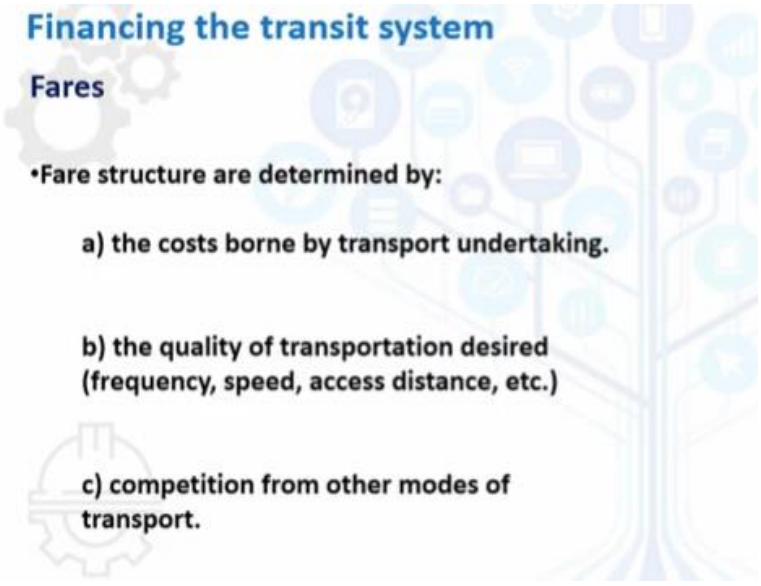

So a fare structure can either be determined by the cost borne by the transport undertaking, the quality of the transportation desired and also the competition from other modes of transport. So let us look at each of them, so if the transportation agency that is providing you the services is able to absorb a lot a of costs then the fares may be different, whereas if it is not able to absorb all the costs, that means they have a very tight budget.

In that case, they may be dependent heavily on the fares in order to operate. If you also have different frequencies, for eg., if you expect that you have higher frequencies during peak times of travel, or you may want to provide a night time services, etc., then additionally fares may be different during different times of service, i.e. there may have different fares during different times of the day.

Additionally, if you say that there are multiple public transport modes, for eg., some of the metropolitan cities have different types of buses, such as may be government buses or may be private buses, which creates much competition, and then if there is metro rail as well, the competition is higher. So if there are multiple agencies providing public transportation services, then competition also determines how much fare can be charged.

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Transit fare structures have a direct influence on the patronage and the productivity of the system. So if the fares are high, in most cases public transportation systems will have low ridership. That is why people are not very keen to raise public transportation fares as it may lead to lesser number of people taking the system and then the revenues will further fall.

However, in order to maintain the frequency of service or the productivity, they have to charge certain amount of money and they cannot charge anything below. So that kind of a balancing has to be done. Again, since these are for the masses of the city, and mostly a large majority of the masses are either middle class or around the poverty line in majority of the cities and towns, so

we have to always make sure that the fares are reasonable for them as well so that they can take the public transportation system.

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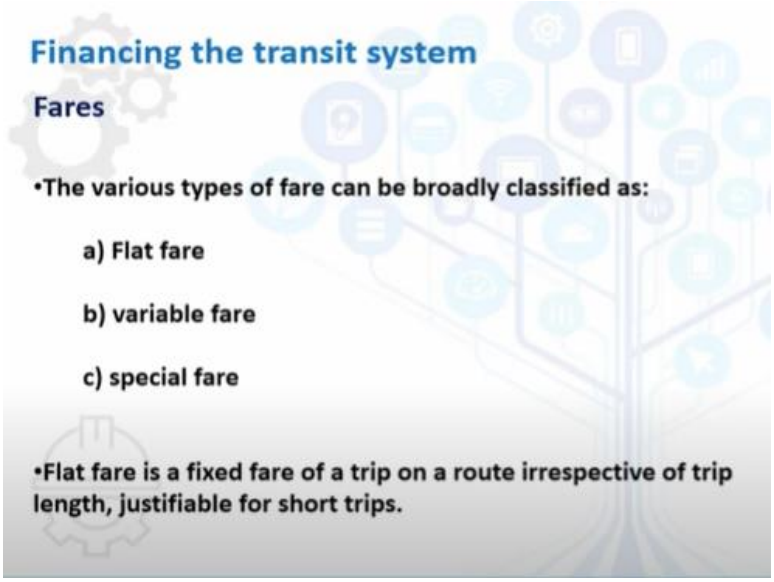

Now there are different types of fares, but they can be broadly classified into these 3 types -- one is called a flat fare, one is the variable fare, and one is special far. So, flat fare meaning, a fixed rate of trip on a route, irrespective of the trip length, justifiable for short trips. You sometimes may see that a flat rate is being charged for certain kind of public transportation trips. This may be not very largely observable in our cities.

But if you go to special areas, such as say transport from airport parking to the airport terminal. The parking may be at 2 or 3 different distances, from the terminal itself, but a flat fare is charged. Usually when you travel abroad, in larger airport systems you would see such kind of flat fares. Also if you have a small monorail for example, for short travel distances in certain cities they just charge you a flat fare.

Light rail transport also sometimes in some cities have flat fare, so it does not matter if you are travelling for 1 kilometer or 2 kilometers or 10 kilometers, it may not of ten kilometers, because it is usually very shorter trips, so then a flat fare is charged.

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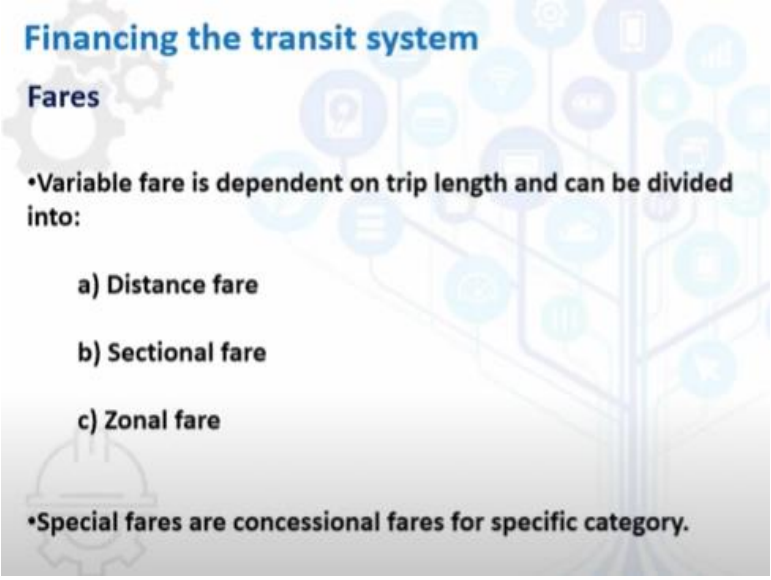

Mostly, the fares are variable and they are dependent upon the trip length and they can be again classified into 3 broad categories distance fares, sectional fares or zonal fares. So what are these?

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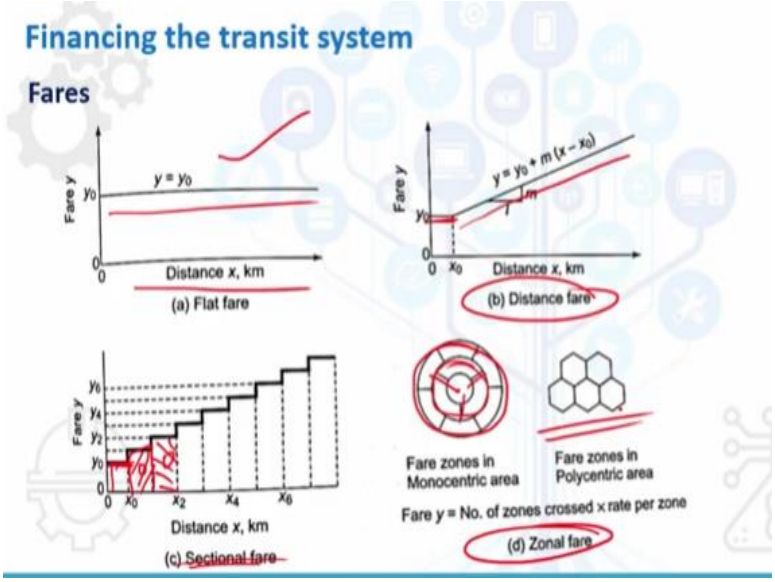

So these are examples. The chart shows you flat fare, so this is kind of a flat fares, i.e. does not matter the distance you are travelling, you are always paying constant fare or constant rate. This is a distance paid fare. So the fare for certain distance remains flat and then it kind of goes up at a certain rate. Now what is called sectional fare? This you may notice in some of the bus systems also, but mostly in the metro rail system.

So for a certain section your fare remains constant right. So anywhere you travel between these 2 points your fare remains constant. Then there is another section where your fare is kind of constant within that section but then if you travel from this section to this section then your fare goes up. So this is kind is called a sectional fare. And then you may have a zonal fare system as well.

So if you have a city such as Delhi, where everything radiates out of the center, then you may have 1 radial zone within which they charges the same, only when you go out of that zone then you may be charged a different fare. There are also polycentric area fares that can be applied for your cities urban transportation system or bus transport system.

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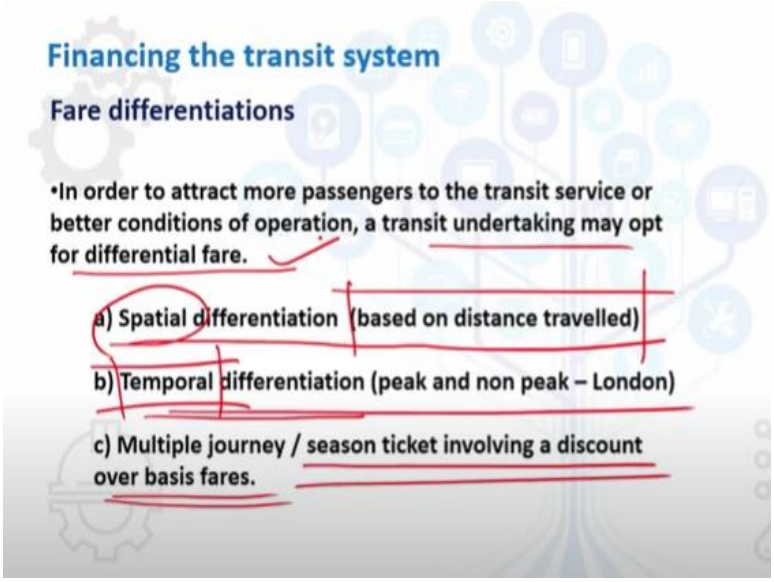

Fare differentiation -- in order to attract more passengers to the transit service, transit undertaking may opt for a differential fare. So now differential fare is either spatial differentiation or temporal differentiation or multiple journey season ticket involving discount of over basis fare. So, spatial differentiation meaning when you are looking at different fares based on distance travelled, within a maybe a central business district, so on and so forth.

So if you are traveling to the central business district in the morning in a peak period, you may be charged a different fare, versus if you are travelling in the opposite direction from the central business district to the suburb. As your route, i.e. space along the road, that you have travelled is

different you may be charged a different fare. Whereas, during different times of the day you may also be charged different fare.

If it is off peak period, you may be charged different fare, versus if it is peak period you may be charged different fare. Similarly if you are, say a season pass holder, for eg. you can have monthly pass, or you can have special 3-day pass, especially when you go to new city a foreign city where you do not know the route what you usually do is you just buy a 2 day 3 day pass, so that you can just use a transportation system as you wish, and you do not have to pay every time you get on it. So these are all examples of differential fare systems that a transit authority develops in order to attract people towards the use of their public transport systems.

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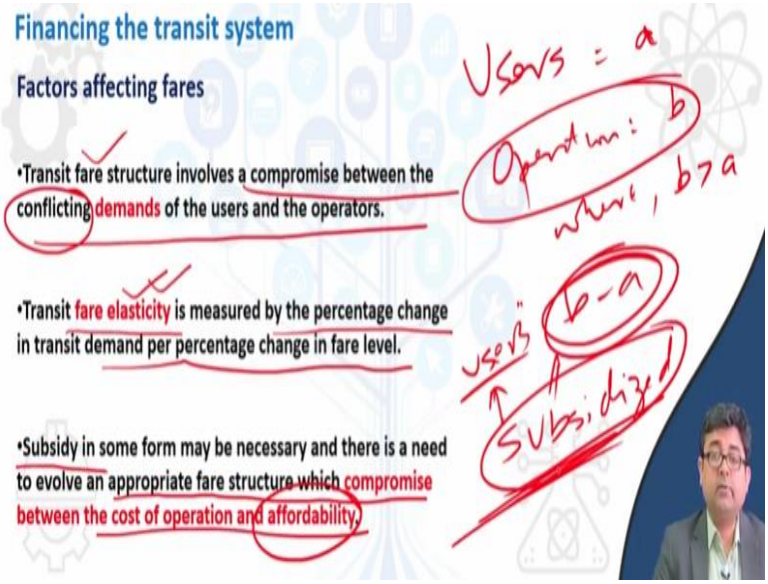

Now what are the factors that affect fares? It is a compromise between the demands of the users and the operators, and often these demands are conflicting in nature. Like I said earlier, people (users) always want the rates to be lower, or the fares should be lower, whereas the operators have to maintain a certain fare in order for them to operate, i.e. do their regular maintenance and also to grow because the population in city is ever growing.

So the public transportation system also has to grow. In order for them to grow, i.e. buying new buses or add new trains, or add new metro rail, or whatever, they have to always have some surplus earning which they can then invest in purchasing newer vehicle or newer buses, newer

metro rails, etc. So they always have to charge a commensurate fare, whereas the public always wants to keeps their fares low.

So how do we come to a compromise? If a transit fare structure has to reach that optimal level, often what is calculated is the transit fare elasticity. It is measured by the percentage change in transit demand per percentage change in fare level. So you measure how sensitive your fares are; for eg., if you increase the fare by 5%, would the ridership change by 5%? Would it go up or it go down? Or would it change by 4%, or only 2 1/2 %, or will it change by 6%,7 %, etc..

So how elastic is your fare? Is the fare fairly elastic or is it plastic, i.e. inelastic? So that is what people determine or operators and researchers often try to determine -- how much fare elasticity occurs in your city?. This will be different for different cities because it all depends upon the socio economics of your city. If your city has lot of middle income or upper middle income residents, then the fare elasticity will be relatively less.

Whereas if you have a city that has lower middle income group or income groups under the poverty line or at the poverty line, then fare elasticity is little high. I mean little bit change in the fare level will bring about a lot of change in the ridership numbers. So this is fare elasticity, which is very much calculated by the operator. Now here comes in the subsidy, which can be applied appropriately to the fare structure and a compromise between the cost of operation and affordability can be reached.

Now in this balancing act saying that the operators have to charge x amount, or it costs x amount of money per person, whereas the user wants it x minus ‘a’ amount. So they always want less. So to cover the costs, operators want the fare to be at ‘b’ where ‘b’ is greater than ’a’. So this difference, i.e. ‘b-a’– is sometimes subsidized. So subsidized meaning, somebody is paying for, but it is not the users that are paying for it, somebody else is paying for this extra money that is required because the operators just cannot operate below a fare of B, and that is called the subsidy. It is usually the government that provides subsidy.

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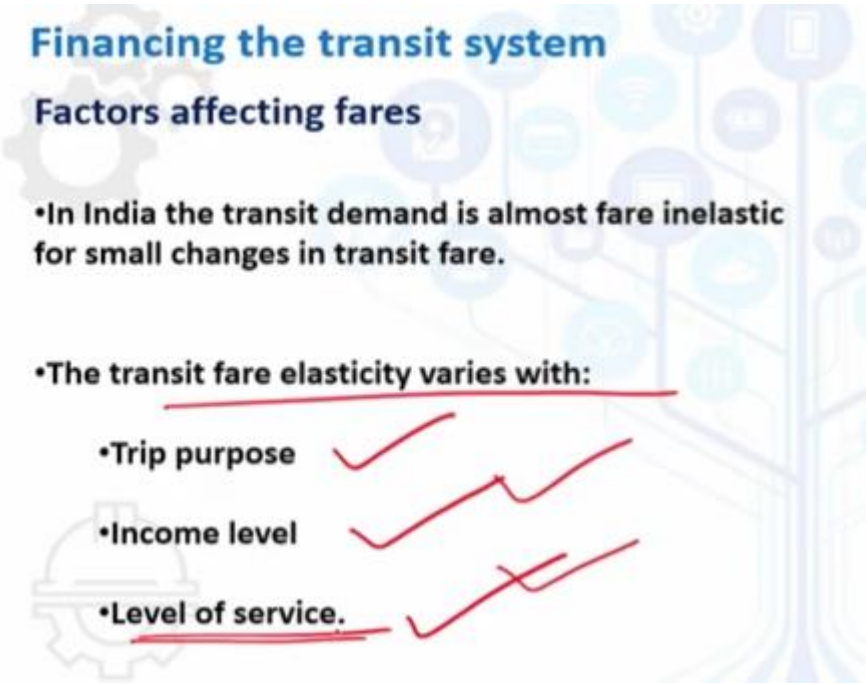

So factors affecting fares in India -- the transit demand is almost fare inelastic. For small changes in the transit fare, we are at a point where public transportation systems are operating at a very low fare,. so little bit increase does not change much. So that is good state where we are. However, fare elasticity varies with income level, and also with, like I said earlier, trip purpose and also the level of service offered. Trip purpose meaning it is fairly inelastic when you are going to work.

So when you are going to work every day you know that this "work" is a very important place, you have to be reach there, and you have to use public transportation. So even if the fare is a little bit higher, I am willing to pay. However, if it is a weekend trip where you are going for leisure and that trip purpose is going to a movie theatre or something, you may think twice that if the price is higher would I be willing to pay for it or not.

So that is what is called trip purpose. Of course, income level we have already discussed and the level of service that is offered by the buses or the metro. For eg. if you are assured a seat on the bus when you buy a bus ticket, then you may be willing to pay higher for that kind of a ticket, whereas if you are not assured a seat and you are said that if your seat is available you can sit, otherwise you have to travel standing, then you may be not willing to pay higher. So that is called the level of service that is offered. Air conditioned buses also are offering higher level of

service. Some buses in developed countries have Wifi systems that allow you to work on the metro or the bus. So that offer a higher level of service, then you are willing to pay higher in those cases.

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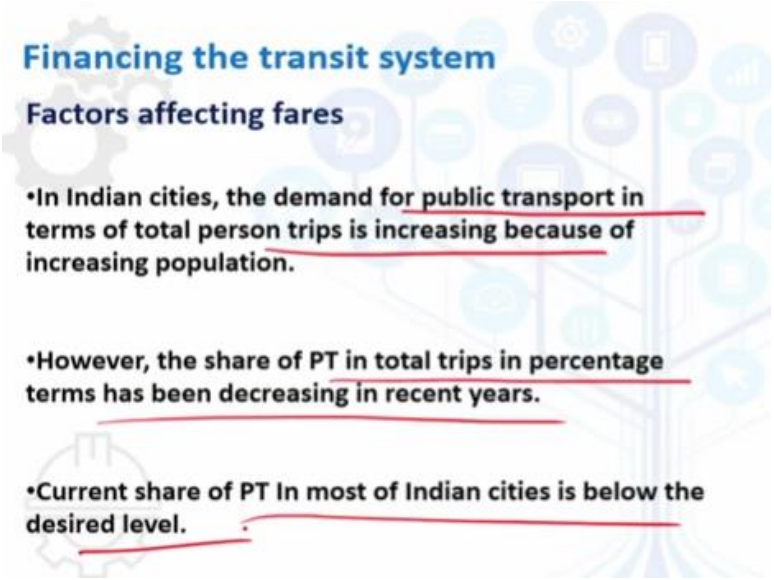

In Indian cities the demand for public transport, in terms of total person trips, is increasing because the population is increasing. However, the total trip in percentage terms has decreased or the share of public transportation has decreased, i.e. the number of people using public transportation versus the number of people using their own modes of transport, 2 wheelers or 4 wheelers, that percentage is going down. So fewer and fewer people or percentage of people are using public transportation and current share of it is below the desired level. So this is a cause of concern in most of the cities in India. Because if public transportation shares goes down that means there are more number of private cars and private 2 wheelers on the road and that is usually an indicator of higher levels of congestion on your urban streets.

So what can be done? How can the fares be structured in order to gain these riders back to the public transportation system? This is always the main focus for operators in India; and not only Indian cities, but also majority of the cities across the world.

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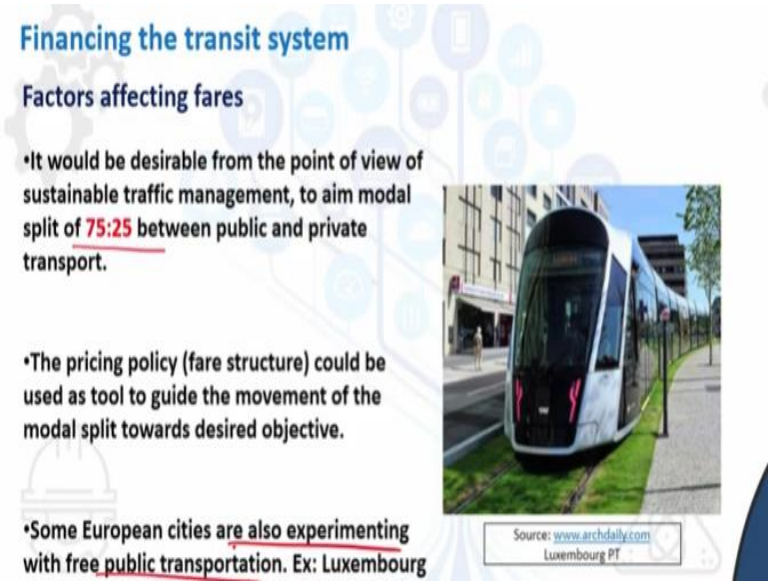

Ideally the aim would be for any city is to have a 75, 25 split between public and private transport. So you want that 75% of trips that are taken in city are taken by public transportation and a quarter of them can be taken using your private modes. So in order to achieve this kind of split many cities are also experimenting with free public transportation. So when people are offered free public transportation the justification offered is economic benefits of it are much higher than the actual financial losses that may be incurred because there are no fares.

So the benefits cost analysis is done in terms of economic benefits rather than merely on financial or revenue benefits, because then you would have lesser emissions, improved health, etc. So emission has a cost associated with it, and all those cost add up to say that a free public transportation is much more beneficial to a city rather than having a having them charged for, now this is just being experimented in many cities.

You may have heard of New Delhi also offering free public transportation to its women users. So those are all schemes behind which a lot of calculation goes on in order to understand how sustainable such pricing policies are.

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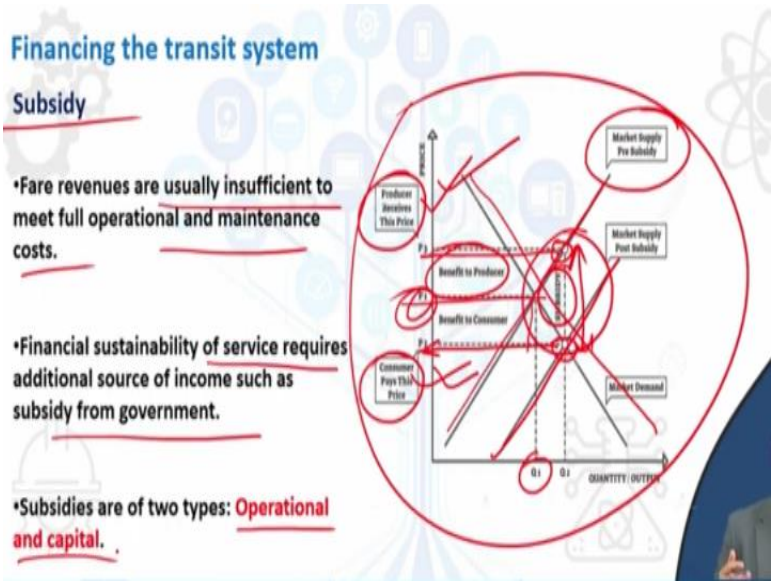

This is a very basic figure that shows how subsidy works. Fare revenues are, like we said, they are usually insufficient to meet operational, maintenance cost, and as such financial sustainability of service requires additional source of income such as subsidy from the government. So I mean, if you look at supply demand curve, so this is the demand of public transportation services, and if this is the supply curve prior to subsidy, so prior to subsidy, anybody is paying the fare of this much of P1, for an output or quantity so there may be N number of buses that is running at that price in your system. Whereas if a subsidy is introduced or government says that okay we will introduce subsidy then there will be a new supply curve that will be developed in the system and then that supply curve the subsidy would be the difference between the fare that is now paid by the consumer versus the fare that is received by the operating agency.

So this difference in price is called subsidy. So the benefit to the operator is still high, they are getting their money and at the same time the consumer is not paying more. So that difference is now being paid by the government that is called the subsidy. The subsidy may be operational or capital, so capital subsidy meaning for buying the buses upfront onetime cost subsidy can be given, whereas operational subsidy meaning during the operation period.

If a fare is 10 rupees then government says we will pay 5 rupees for it and 5 rupees charged to the user those are all operational subsidy.

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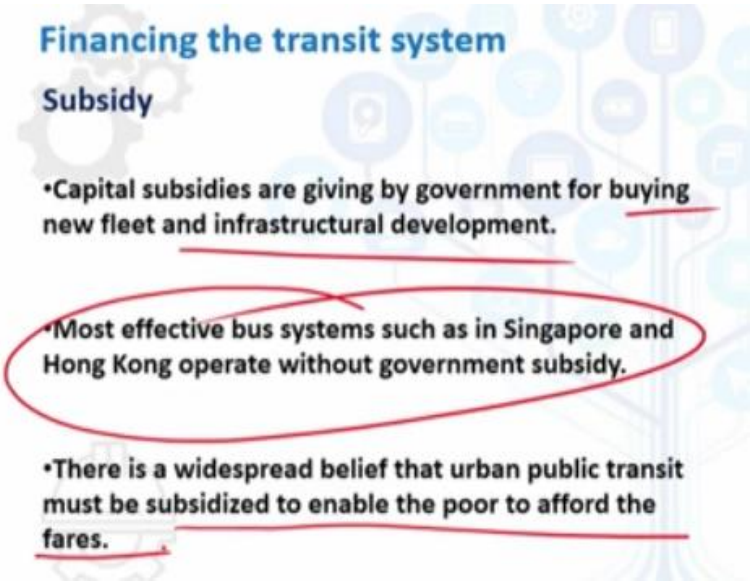

However most effective bus systems do not want to run on subsidy, because this subsidy, if it is government paying the subsidy, many times it adds extra burden on the government, and burden the government means burden of the people, in form of paying taxes. So many people are opposed to usually any kind of subsidy paid by the government. That is the reason that now some of the public transportation systems are going towards the PPP mode or trying to encourage or trying to have just private transportation.

Private public transportation modes allows the market forces to take over and determine the fare and rather than the government coming in and providing subsidies. However, we have to remember that this is mass transportation, or public transportation. So your weakest part of the society or your vulnerable people in the society have to be able to afford these mass transportation systems otherwise they are not serving their purpose.

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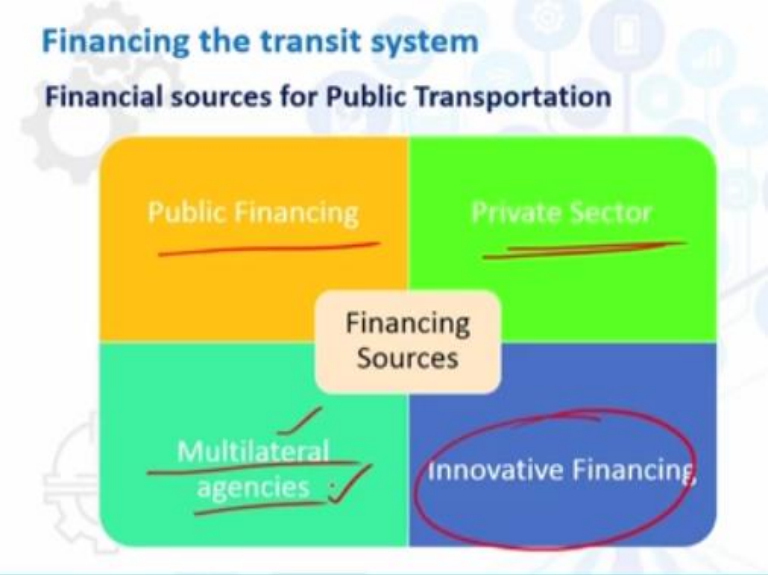

Now in order to conclude, these are the different types of financial measures that can be taken up in order to raise finances. It usually comes in from public finances; it can look at now private sectors -- many of the metros now are being developed in a PPP mode. In other ways you can say that capital costs are put in by the private sector and the operational costs are being taken care by the public sectors.

So in that way the fares are being determined in such a manner that it does not put extra burden on the user but at the same time the operational needs are met. So other innovative financing resources have to be figured out, such as multi-lateral agencies. So now you would see that many of the agencies, in some of the larger cities in India, are collaborating on the fares.

Bus systems are now collaborating with the metro systems, and if you have just 1 smart card you can pay across 2 different types of modes. So this also involves in developing the fare system that is sustainable for the operators and also enables the operators to maintain and operate facilities and also the users do not feel burden by the fare structure. So multilateral agencies are involved in financing different types of public transportation systems, that in-turn determine the optimal fare.

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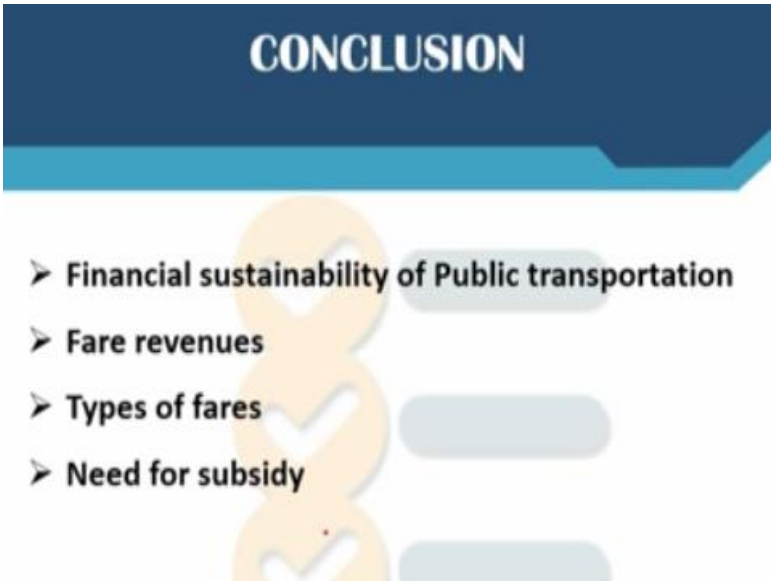

So in conclusion, in this lecture series we have looked at how fare revenues are structured, what are the factors that are involved in determining the fare structure in your city, what is fare elasticity, how are fare levels directly related to your ridership. So you cannot change the fares a whole lot and then the entire concept of subsidy. How subsidy can kick in when there is a large gap between what users are willing to pay and what the operators need to run this service. So we have introduced you to the concept of subsidy as well.

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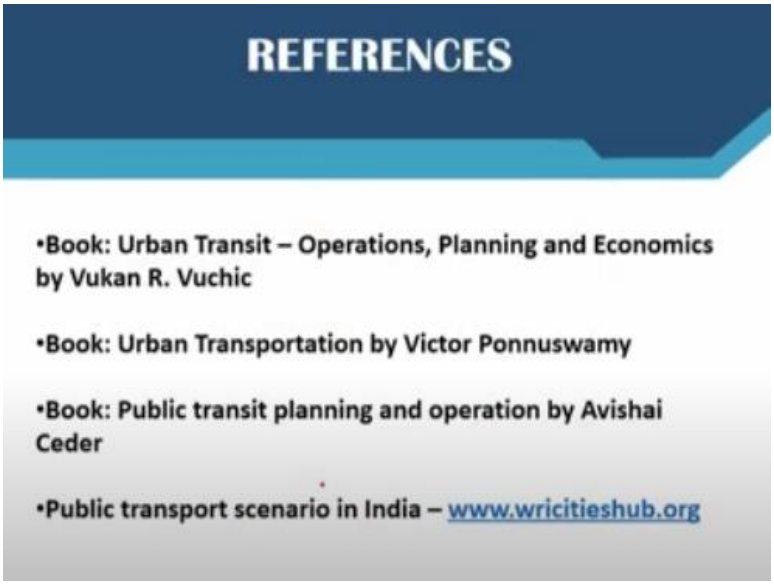

Here are some references for your further reading. Thank you very much for your attention.