Modelling and Analytics for Supply Chain Management
Professor Anupam Ghosh
Vinod Gupta School of Management
Indian Institute of Technology, Kharagpur
Lecture 35
Transport systems: India and World

Hello, and welcome to modelling and analytics for supply chain management. We are into week 8 lecture 35 of this course. Today, we will give you a broad overview about transportation systems both in India and the world. Why is this necessary? Because today, as you have appreciated over the last 7 weeks, designing, managing global supply chains have become a very, very competitive and very, very challenging task.

So, if we do not know how and what transportation systems are available in different countries, how will you design a global supply chain because each and every country has their own transportation systems designs, rules and regulations, networks, everything, types of vehicles. So, this is why this is why we need to know the transportation systems both in our country as well as the world.

Now, let us take a simple example. In India, the size of vehicles that we have, the trucks particularly in European countries, the trucks will all be a long haul truck means they will be having many-many such so called small trucks integrated into one. So, you see the total system changes and the road infrastructure that is required to handle such heavy vehicles also is very, very different so, we need to know.

If you are designing a transportation system, or if you are designing a supply chain network using the Indian conditions that may not work out very well as well as or may not be cost effective if you are applying it globally. So, we need to understand the transportation systems, both in our country and the world.

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So, in this week we will cover Indian transportation scene as well as the word situation.

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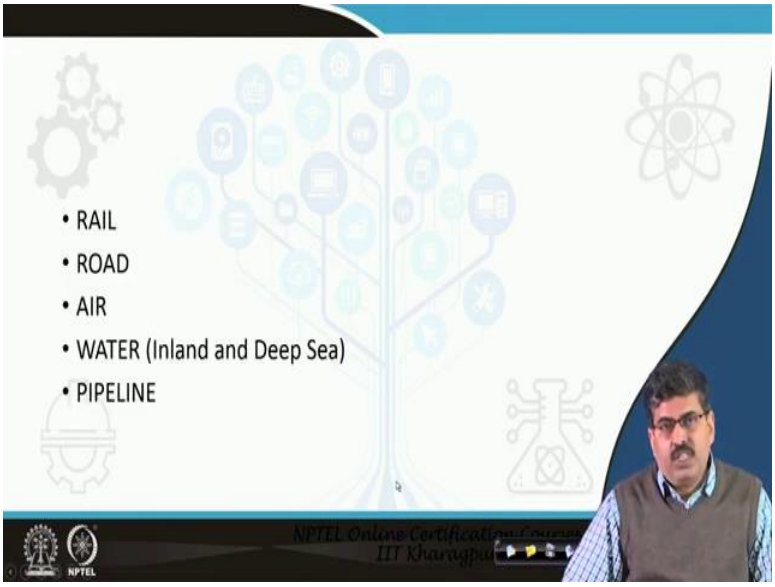

Now, you see the Indian transportation scene, if you see comprises of primarily these five modes of transport road, rail, air, water and pipeline system. Now, of which pipeline system was not that much spread out in India till some years back but now, with the government initiative a lot of work is going on in expanding the pipeline across the country.

Now rail, road, air, water, let us take each of these modes separately and see how they are affecting your supply chain. First take rail transport, none of us can say that we have never travelled by Indian railways.

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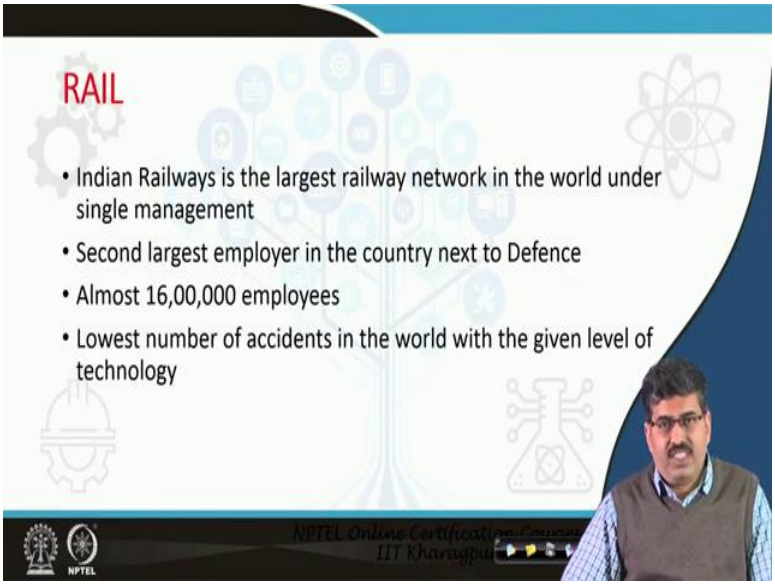

Indian Railways has the fastest if I can use that English India's railways has the largest railway network in the world under single management that means it is managed by only one organization Indian railways, America has the largest railway network but not under single management and it is the second largest employer in this country next to defence and till some earlier estimates almost over 16 lakh employees though the number has come down now, with retirement of employees and bringing in new technology etc. And however it holds the credit to it having the lowest number of accidents in the world with a given level of technology.

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Now see, Indian Railways also have the best capability to construct railway infrastructure in mountainous and rugged terrains including tunnels and simplistic innovations running the most complicated rail network in the world. In fact, the amount the railway network that we have with so many local trains, so many mails expresses running and the technology that we have, it is really a wonder how things run smoothly and effectively given the level of technology, given the develop complexities.

And we have the highest number of rail interlocking in the world which is in Howrah. So, you see, railways have been playing a very major role in nation building in terms of trade and commerce and in this manner supply chain.

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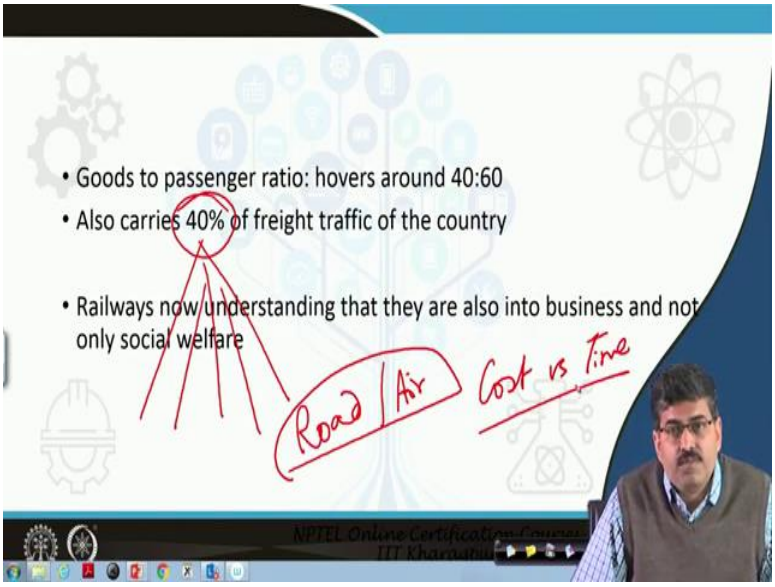

The goods to passenger ratio hovers around 40 60 that means the goods carried are 40 percent and passenger carry does 60 percent and it also carries 40 percent of freight traffic in the country that is what to say, goods carried are 40 percent and railways now understand that they are into business and not only social welfare, this is one.

What I want to say here is that as this you will ask me, what is the relevance of this in this course supply chain modelling? As a supply chain modelling if you want to do a supply chain modelling, you cannot ignore the public transportation system, you cannot ignore railways, you cannot ignore the government road mechanisms.

So, when you are into the railway transportation system, you have to know how the Indian railway systems work, what are the documents involved, everything so that is and if you are

modelling a system without knowledge of that system, then it becomes a problem that is why you need to study Indian Railways.

Now, you see if you just look at this data that we have mentioned here that is the carries 40 percent of the freight traffic of the country, immediately as a supply chain modeller analyst, what question should come to your mind? Let us try to understand as a supply chain modeller what question modelling expert analyst, what question should come into mind?

You see, we are carrying 40 percent of freight traffic, immediately the question comes what has happened to the balance 60 percent of freight traffic, what is the distribution of this balance 60 percent among the various modes of transport, how much is going by road, how much is going by air, how much is going by water.

So, you see immediately and the moment you know this then the next question that should come into your mind as analyst is what is the cost difference? Why is it that Indian Railways carrying 40 percent given the huge network of railway tracks that it has around the country? What is the reasons? What is the cost difference? What is the time difference that we are not getting more than 40 percent?

And over time, it is coming down it is dwindling so, what is the reason? What are the reasons? So, that is the first question that an analyst should ask. See the job of an analyst is not only to generate, to put in numbers in a machine and get output. Job of an analyst is to understand why that output has come.

If you put in some input, click on something machine will give an output. That is not your job, job of an analyst is to understand why that output has come what can we do with that number that is the job. So, you see the question now is it carries 40 percent of freight traffic why that what has happened to the 60 percent road, air, what is the cost vis-a-vis the time, cost verses time of these modes of transport. So, you see you have to be very-very careful about these things. And that is why the statement comes railway is now understanding that they are into business not into only social welfare.

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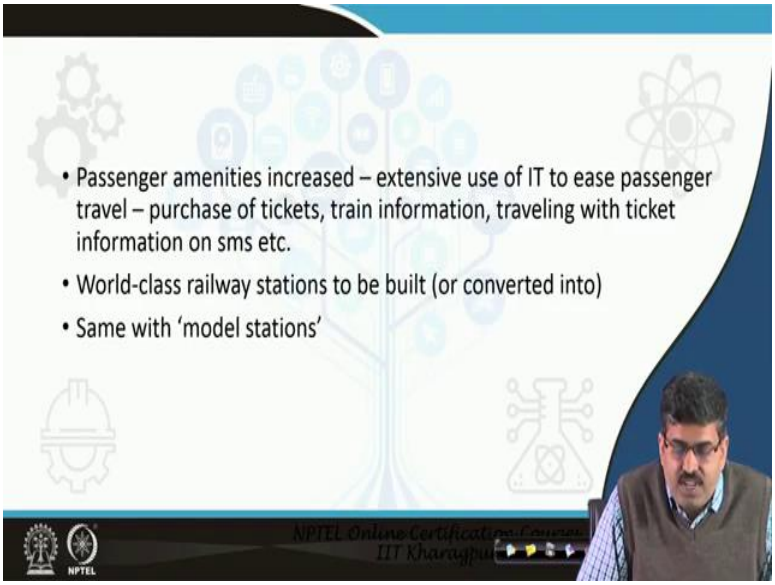

Now, we have the passenger amenities have increased, extensive use of IT to ease passenger travel, world class railway stations to be built or converted into, some are already done. Now, why do you think these are being done? If you look at it, it looks very simple, it looks like nothing has happened nothing very great.

But if you see if you are doing these things, your products are moving very fast and if your products are moving very fast, what is happening your transportation costs are coming down and if your transportation costs are coming down then your supply chain costs are coming down. So, any movement which is smooth, it leads to reduction in cost of transportation.

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Stations are very much contrast to the picture outside, catering services have improved, introduction of calorie based food value, converting non-core transport activities like hotel booking, etc. You see these examples of this Ranchi, Jamshedpur this Tata Nagar, what are these? These are vary the mineral bears and the picture outside is what? That the transport network is not that much developed.

So, but what is the picture inside? You are having a whole network of trains coming from the around the country to this particular point and then moving out so it is connecting the entire country. So, stations are very much contrast with the picture outside where the transportation systems are not developed and inside you have a whole network that is available.

So, converting non-core transport activities or hotel booking etc are also being done. Why again why are we studying this? We are all trying to study the financial viability, again the financial viability of systems, which again is the job of analyst, job of an analyst is not data in data out, it is this role as an interpreter and role as a recommender. So, these are things that you will have to interpret, you will have to recommend. How can you develop alternate modes of business?

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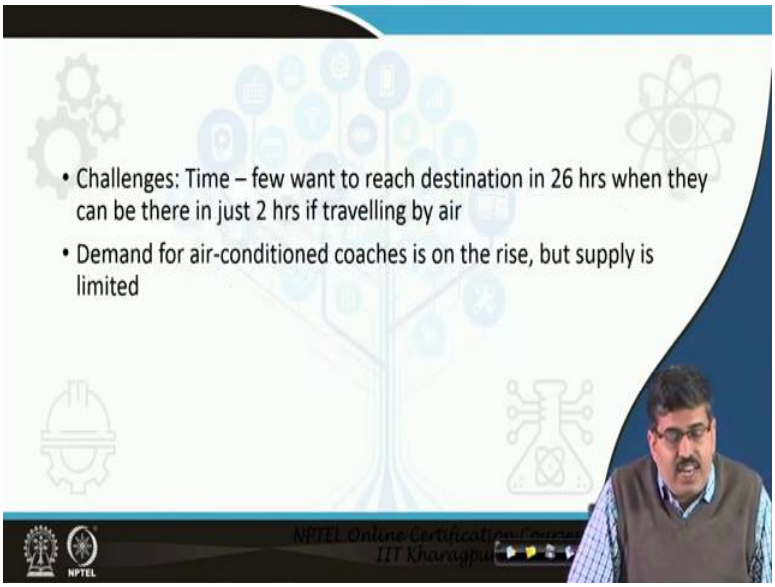

What are the challenges? Few want to reach a destination in 26 hours when they can be there in just two hours if traveling by air. And demand for air conditioned coaches is on the rise where supply is limited. What are the implications? So, your freight traffic is shifting from railway to roadways, roadways to airways.

Now flower is entirely transported through airways. So when your these things are changing, when your modes of transport preferences are changing, then how to improve railways? And AC coaches demand is increasing but the cost of an AC coach is tremendous.

So, an AC coach manufacturing AC goes takes a lot of time. Capital cost is tremendous, manufacturing takes time. Second is the revenue that you get from an AC coach is not that much as compared to the additional costs that we are incurring for introduction of a new AC coach.

So as an analyst, you are in a great dilemma, what to do, I am just leaving over situations as an analyst you are in a great dilemma what to do? Introduces otherwise passengers move shift, passengers shift that is further loss in revenue. So, is basically the chicken and egg problem that is happening.

Now see, you will have to frame a solution to all these problems. This is something that you need to take care of how you will take care of the financial viability, you increase the revenue, how do you increase the revenue? By passenger fare or by goods transport. Now, increasing the passenger fare is a problem.

It is dealing with the public at large who are using rail as a cheaper mode of transport, so you cannot charge them more. If you increase the goods fair, the goods transportation fair, what is happening? It is coming back to you in a very different form, the price of these goods are increasing incrementally, because railway fares have increased.

And other hand what is happening, products are shifting towards road because then there is no loading unloading multiple times it is doorstep destination. So, as a result what is happening, the financial viability of the railway systems are coming down, down and down. So, as an analyst you will have to look into what are the areas, what are the aspects that need to be improved to keep things within limits, to keep things within control and have a smooth and efficient mode of transport?

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For goods business railways have entered into providing ICDs and CFSs through Container Corporation. CONCOR now provides facilities for movement of goods overseas also. Now, what are ICDs and CFSs ICDs and CFSs are basically the inland container depots and container freight stations.

Basically what it means, say you are a very very small exporter or a businessman, now you have only this much of goods that you have manufactured. You do not need to book a full container or a full wagon. What you are doing? You are taking your products to the nearest container freight stations. And there railway is clubbing your consignment and sending it via wagon, so it is like booking a parcel, but at a cheaper rate.

So, in the inland container depots are also like that, where big containers will come, they will be loaded unloaded and then they will be taken by trucks. So, Container Corporation is a separate unit of the Indian Railways which is doing this activity. Again, I am saying that you need to understand this to understand the dynamics of modelling.

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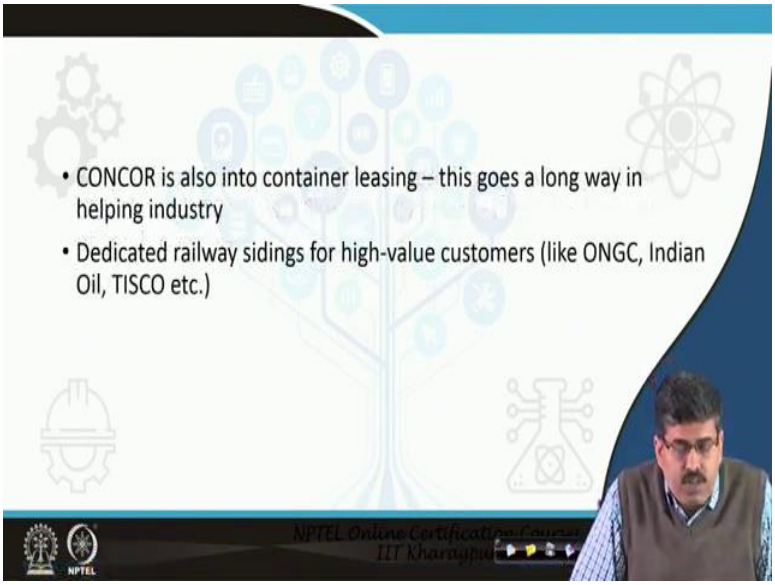

Here CONCOR is also into container leasing. Now, we are saying about CONCOR, in other countries different other names exist for similar type of function abilities. Now, CONCOR has dedicated railway sidings for high value customers, high value customers means who are giving you more revenue in terms of goods movement, like ONGC, Indian Oil, the Tata Steel, etc.

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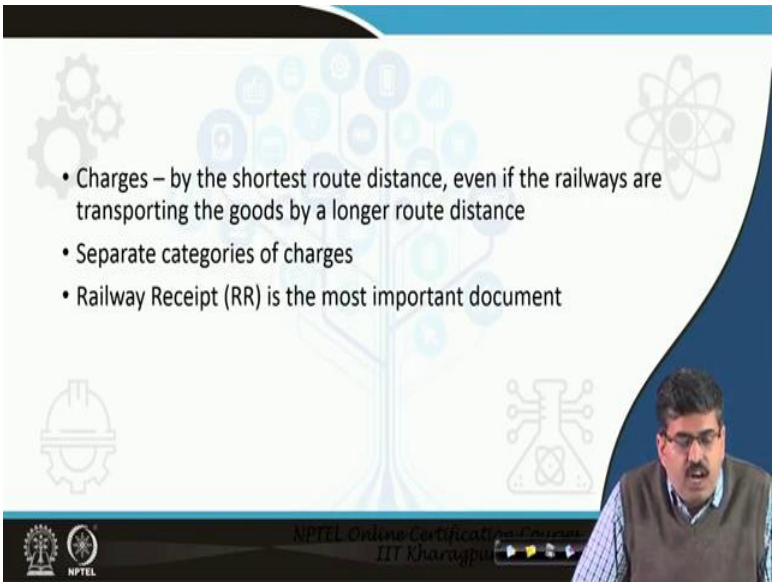

So, these are the facilities that are available, how do the railways charge? Charges by the shortest route distance even if the railways are transporting the goods by a longer route distance. And separate categories of charges and the most important document is the railway receipt, you get the railway receipt, you can give it, you book the cargo you get a receipt and

that receipt is given to you by the Indian Railways that is why it is called as a railway receipt. What you need to do? At the destination point you can show this railway receipt and take back your goods now. So, it is not possible? You do not physically travel with the products to the destination point.

So, what do you do? You give it to a local bank here, you get the money that bank arranges for getting the railway receipt to be given to the railways and the bank takes the money from the party who receives the goods. So, this same like the something like the bill of lading.

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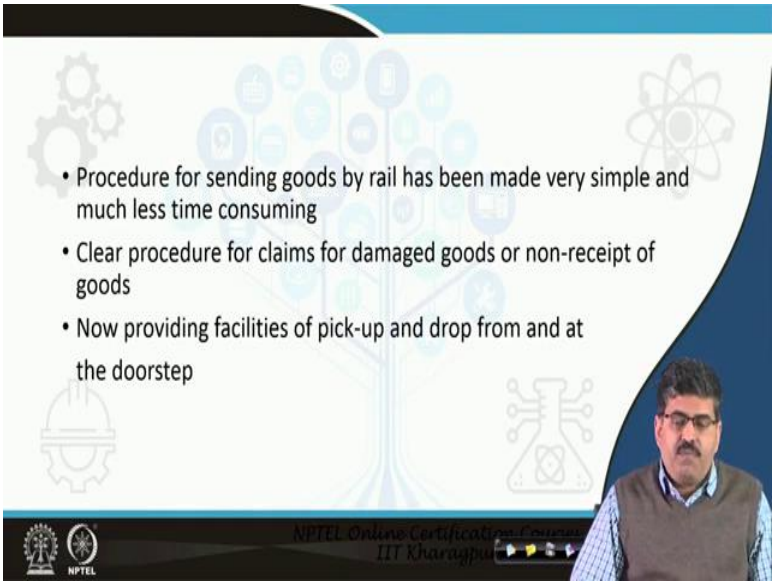

Procedure for sending the goods have been made very simple and much less time consuming, clear procedure for claiming of damaged goods, now providing facility of pickup and drop from at the doorsteps, this is what you railways are providing.

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There are some challenges which you can just go through. Mainly, one of the major challenges is your train gets delayed because we do not have that much of railway tracks that are free nowadays, the line capacity needs to be improved tremendously so this is one. And you can see congested section, the Kirandul-Kotavalasa section is very-very congested, so line capacity needs to be improved.

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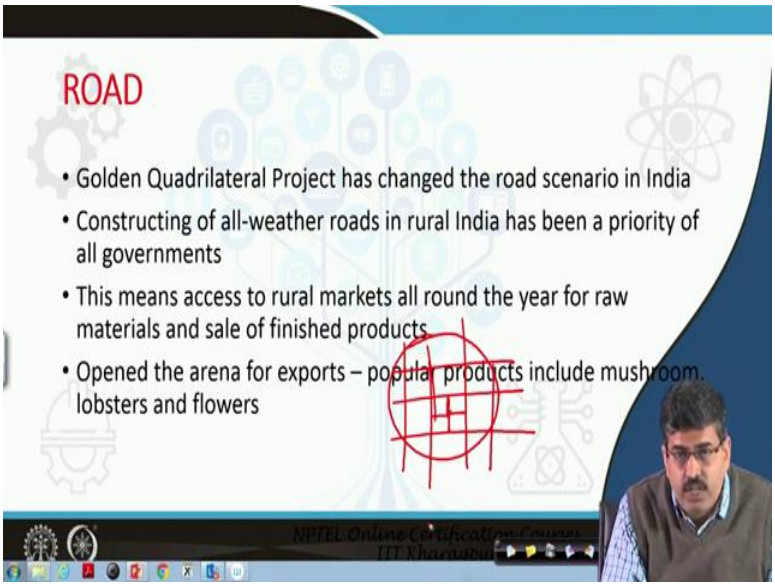

Now let us move to roadways we had a classic Golden Quadrilateral project and that has changed the road scenario what is the project all about? Basically if I can just show you what it says is golden quadrilateral project what it says is if this is a circle circular area, you divide

the area into square grids of 1 kilometre that means, wherever your house is, whichever direction you go within 1 kilometre, you are getting a concrete road or a pucca road, tar road.

Pucca road, concrete road means what? It is an all-weather road. All Weather means what, it is opening up entire access to the city for all the seasons, otherwise you would have access to the city only during the winter and the summer months but rainy season you would not so. And this is what has happened look at the last point, opens the arena for exports, popular products are mushrooms and lobsters and flowers.

This is a huge trade opportunity and foreign exchange earning has opened up. Now, why again I am saying this, when you are designing a system you need to know how deep inside a village you need access to, to get the proper raw materials.

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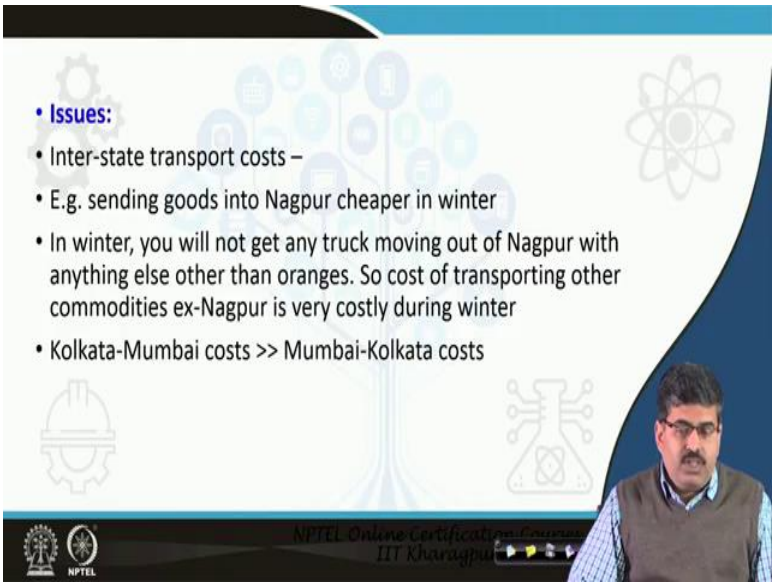

What are the issues? See interstate transport costs differ, sending goods into Nagpur is cheaper in winter, in winter you will not get any truck moving out of Nagpur with anything else other than oranges so cost of transporting other commodities is very costly during winter. Now, let us take a simple example Kolkata-Mumbai costs is definitely greater than the Mumbai-Kolkata costs.

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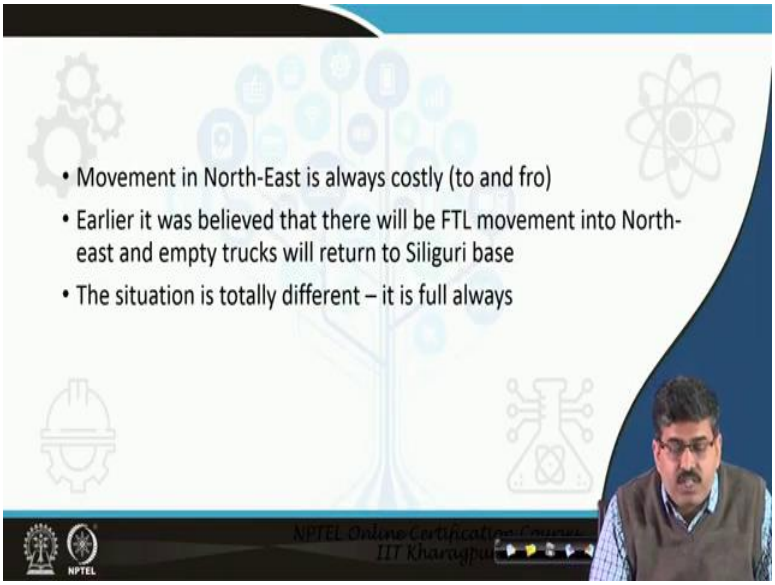

Movement in northeast is always costly to and fro. Earlier it was believed that there would be full truck lift movement into north-east and empty trucks will return to Siliguri base, situation is totally different now it is full always. So, slowly you will see these changes coming in and we will constantly need to change the modelling patterns that we are looking into.

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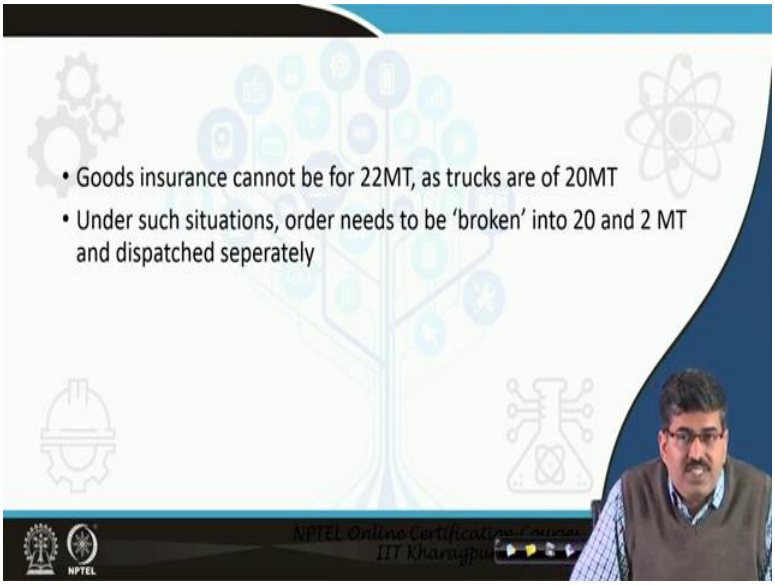

Goods insurance, now see the other issues, goods insurance cannot be perpended to metric tons as trucks are of 20 MT. Under certain situations order needs to be broken into 20 and 2 MT and adjusted separately, dispatched separately. So, there are so many issues where you had discussed while you are designing the modelling for transportation.

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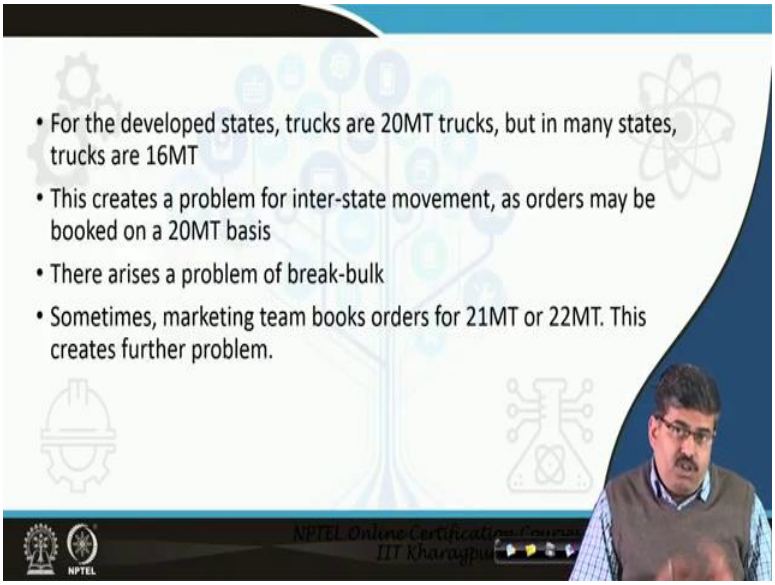

Now, see other issues, look at the break-bulk situation, how do you model it? For the developed states, trucks are 20 metric ton trucks but in many states trucks are 16 metric tons. This is a problem for Interstate movement as orders may be booked on a 20 metric ton basis. What has happened, you have booked the orders in 20 metric ton basis but your trucks, you are taken a big truck from Mumbai to some other place, but then in between it is being loaded into a local truck.

Now, this local truck is a 16 metric ton truck and you have booked 20 MT, so what happens? So there are so many issues involved, what happens to the 4 metric ton of goods, you do not get 20 MT truck in some states. So there is a problem of break bulk, sometimes marketing team books orders for 21 metric ton or 22 metric ton and what is the capacity, 16 metric ton so it creates further problems.

So, these are some small things that need to be very-very careful when you are modelling your supply chain because anywhere any excess means added cost and your supply chain is not able to cope up with that. That brings us to the concept of flexibility, we will review which we will do a bit later on.

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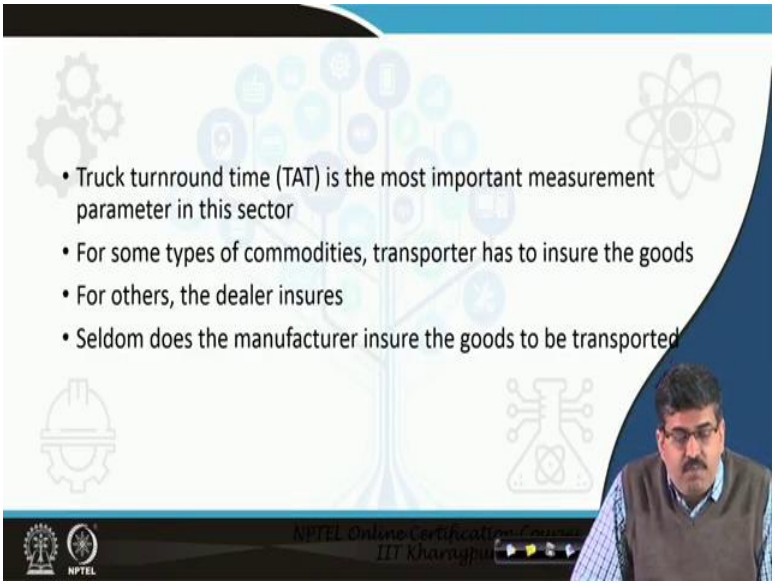

Truck turnaround time is the most important measured parameter in this sector. For some types of commodities transport as if to insure the goods for others the dealer insures. Seldom is the manufacturer ensures the goods to be transported. So again, how does it affects the course of supply chain, you will have to know.

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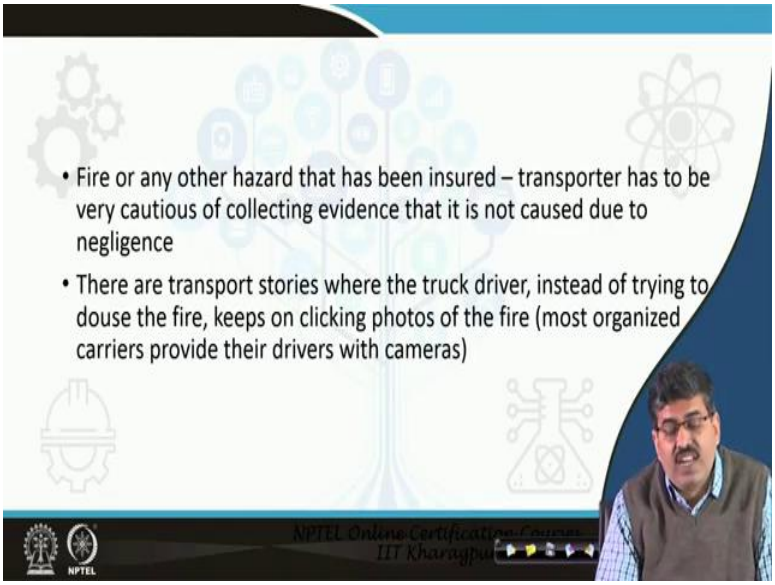

Fire and other hazards that has been insured, transporter has to be very cautious of collecting evidence that is not caused by negligence. So again, your cost will increase, how to model that. There are transport stories with the truck drivers instead of trying to douse the fire keeps on clicking photos of fire, most organized carriers provide the drivers with cameras.

This may not be true these are as I said these are stories because you will have to give proof that it was not due to negligence, it is due to an accident. So, more than dousing the flame you are busy clicking pictures, sometimes not India, but in many places this has happened.

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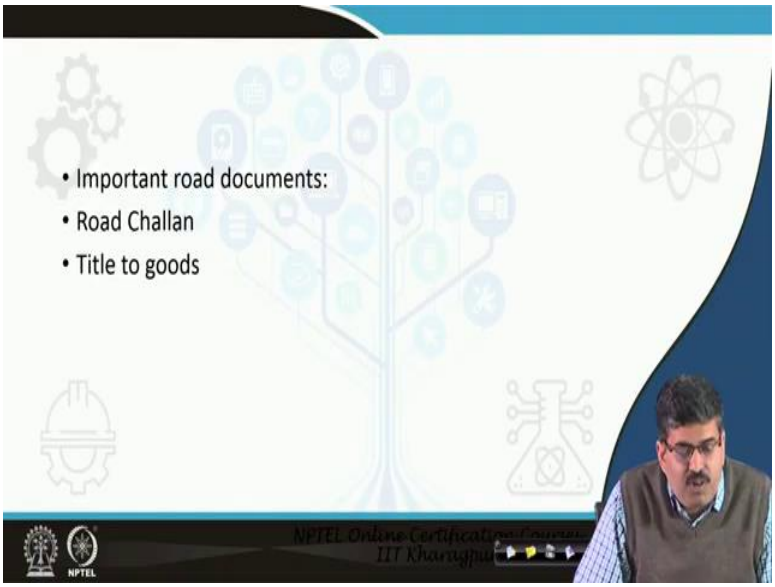

What are the road documents, road challan entitled to goods without, these economic move.

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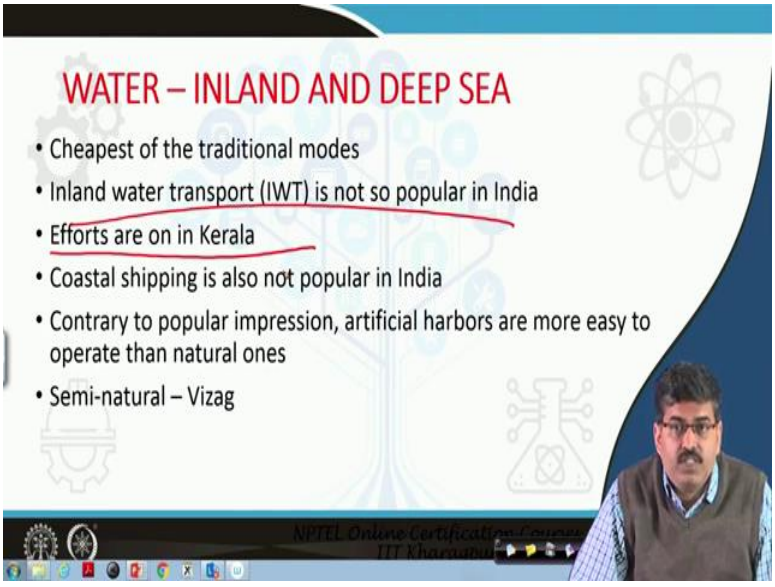

Water, now look inland and deep sea this is what I want to say here which is very important. Earlier we had a very-very beautiful, good, efficient water transport system pre independence. With the paucity of transportation systems, road transport not developed, railways not that advanced as we see today, river was a very-very effective mode of transport.

The rivers had the depth, what is happening now with tremendous urbanization you require the products in a very-very less time. So, what is happening your, the river transport is slowly dying down. So, inland water transport is not so popular in India now, which is this point, inland water transport is not so popular now.

Efforts are on in Kerala, in Kerala they are using the backwaters to transport goods and government is giving some incentives I believe. So, coastal shipping is also not popular. Contrary to popular impression artificial harbours are more easy to operate than natural ones. Semi natural harbour is Vizag which is doing very-very well.

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So, in Europe it is compulsory to transport goods by IWT Inland Water Transport if it exceeds certain distance kilometres so that is something you need to be very careful about.

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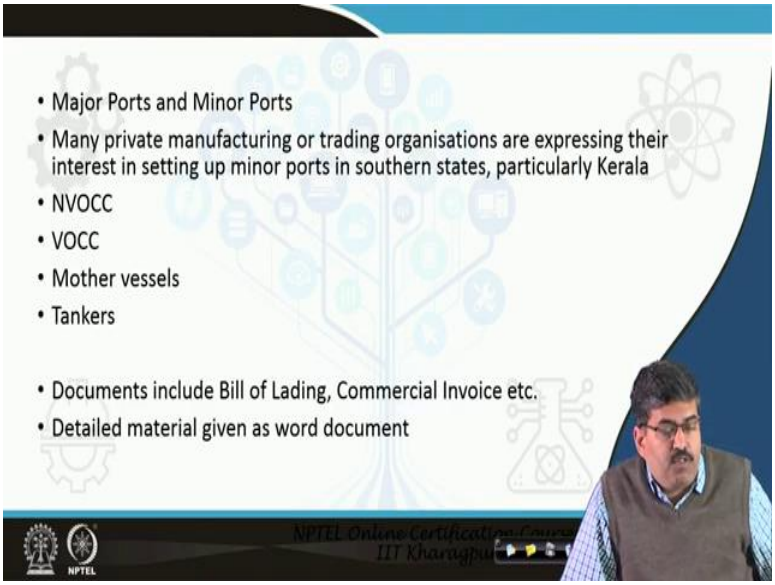

Major ports, minor ports, private manufacturer using their interest in setting a minor ports because Kerala is a huge base for selling of floor tiles, NVOCC, VOCC, Mother vessels, Tankers, these are all terms that we keep on using when we design a global supply chain, what are the documents there will be Bill of lading, commercial invoice detailed we will provide a word document that will give you the detailed material on these bill of lading commercial invoices.

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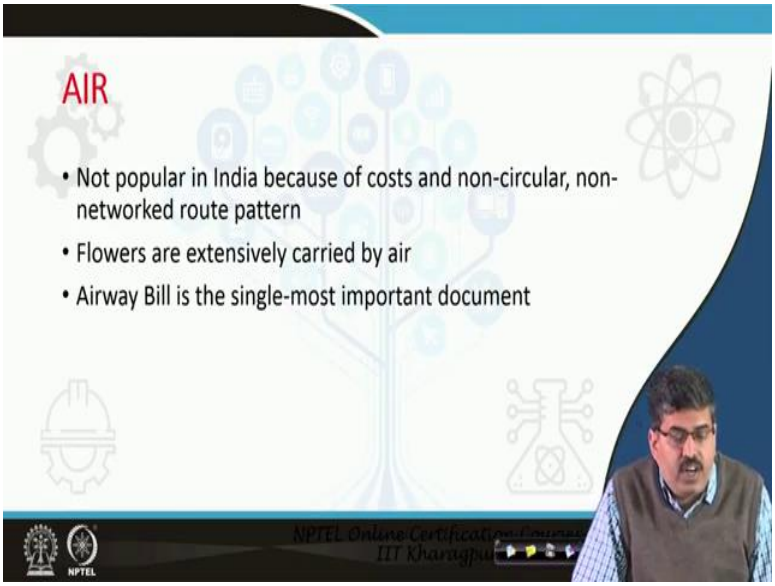

Air Transport air waybill is a single most important document.

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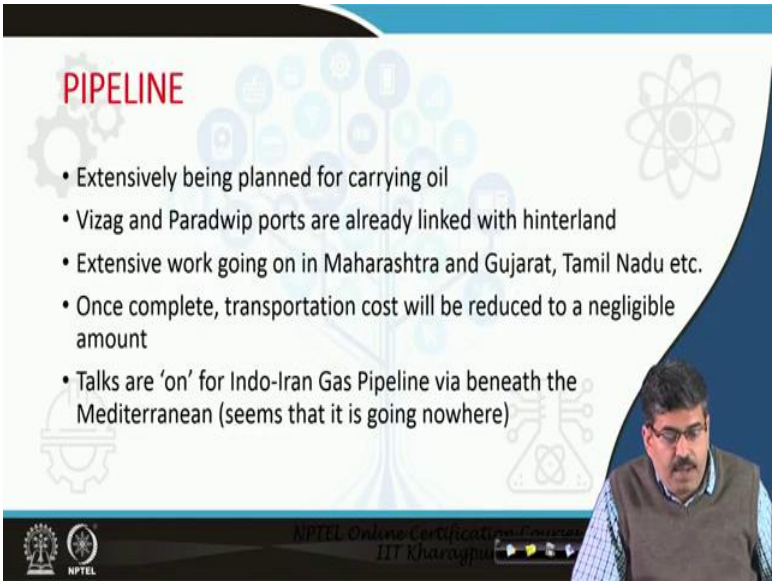

And pipeline, we are beneath the indo-Iran gas pipeline and this brings us to the end of this particular module, this particular week's lecture on the transportation systems. Thank you.