Indian Institute of Science
Bangalore

NPTEL

National Programme on
Technology Enhanced Learning

Global Supply Chain Management

Lecture-38
How to use the Video lectures

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This lecture is basically for either instructors who are teaching this course or for self learners who are trying to basically see you know how many lectures they should follow and what are the fundamentals about so if you listen to this then you can plan for the course.

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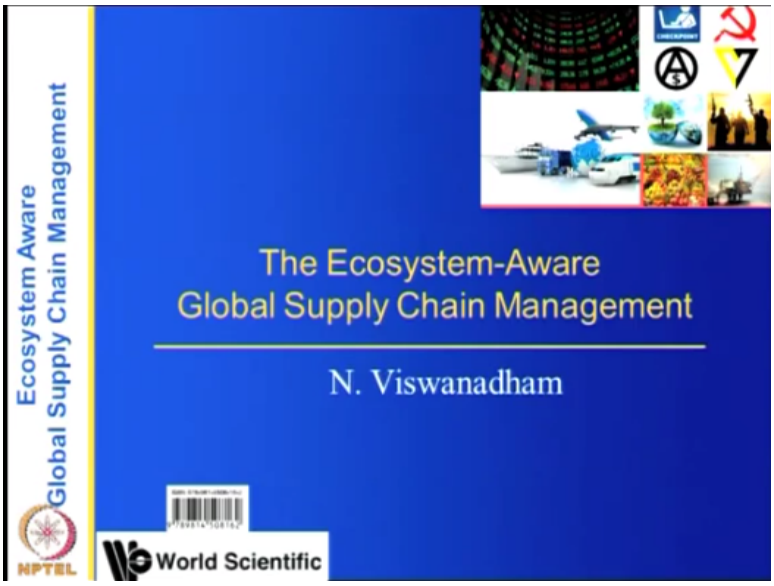

So that is where this is and the ecosystem aware global supply chain management this is the title of the book that has been published already by world scientific this year.

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So and the well the contents of this lecture let us look at the motivation for starting off this and the ecosystem model and the grip framework and look at applications green supply chain design if possible and some conclusions so what we are going to do is look at the various things.

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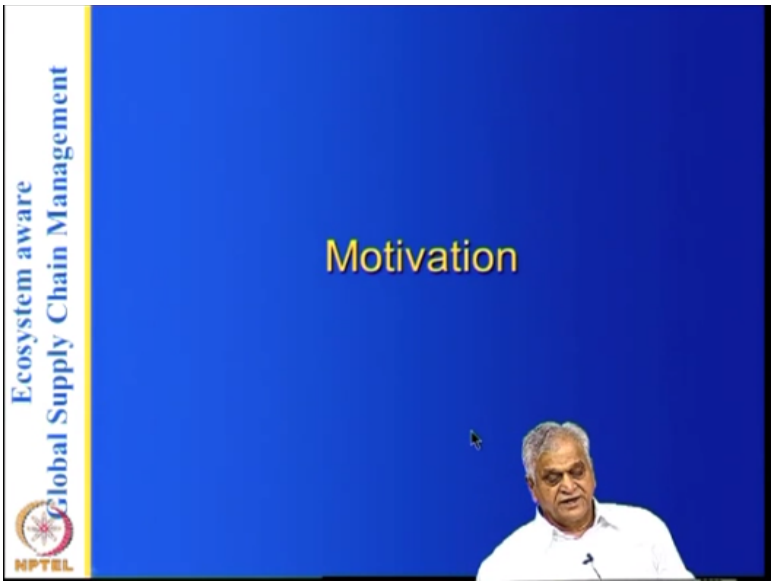

The first lecture is on motivation.

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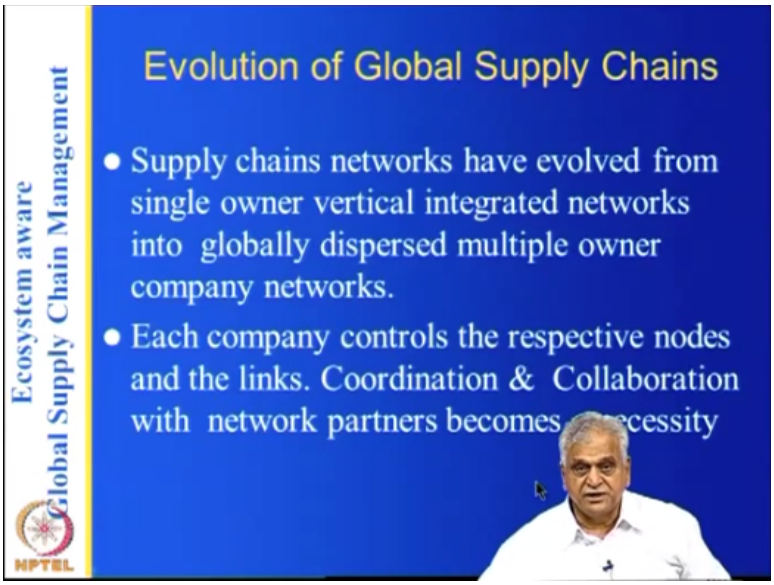

That is how global supply chains have evolved a pleasure networks have a world from single owner vertically integrated network into globally dispersed multiple owner company networks this is a big difference that is because if you look at the supply chains like what Henry Ford had in 1930 or later the General Motors Chrysler and even IBM and Intel another's all big companies they are basically vertically integrated vertically integrated meaning they can be global they can be anywhere in the world .

But there is only one owner and the owner is either IBM or Intel or whatever GM or something so it all basically started with the auto companies because auto industry is the industry of all industries so and then the whole thing started in 1913 the assembly line of Henry Ford which is very famous where he basically has streamlined all the processes that are involved in the manufacture of the auto this one .

And created an assembly line that is he has people at the various one after another and the parts pass from one to another and they assemble as they go along so but then the governance mechanism of the so called vertical integration came from Alfred Sloan. Alfred Sloan of the General Motors he was the one who basically gave an organization structure that is efficient to govern this. I mean Henry Ford was basically as he is a big inventor of the assembly line but the governance mechanism of the assembly line as the product lines and all that was given by Alfred Sloan .

So but then with the outsourcing what has happened in a pro in electronic and other industries including the auto this has been globally dispersed or regionally dispersed but there are multiple owner networks in the auto you have the design is done by General Motors or somebody and Chrysler or Toyota but there are several partners or suppliers who supply the materials ignite the order from the OEM or the original equipment manufacturer Toyota and so on.

So this is the kind of evolution that has happened now when the evolution of the globally dispersed multiple this one has happened each control company controls the respective nodes and links now if you want to represent this entire supply chain as a graph then each company each supplier is an node, each OEM is an node and so on and then you can have a just depending on who is supplying to whom .

So this is basically a graph and coordination and collaboration with network partners becomes a necessity well it could be a market-oriented mechanism where you order something and you are paying for it and so you basically helped her to follow but that need not have to happen so the coordination and collaboration between people between the network partners becomes an absolute necessity.

So then we have got a world from vertically integrated to global supply chains there are several factors that come into consideration so what are those factors particularly if it is global then the supply chain partners are over all over the world some in China, some in India and you some in Singapore and some in US and so on then each country has their own laws each country has its own labor laws , its own financial laws, its own currency, and its own universities.

So basically when you are dealing with that the multiple partners you are not alone dealing with the company you are dealing with the company's ecosystem which means that the resources, the company has the finance interest, that the company has to pay the foreign exchange, it has the government rules regulations and what is the kind of logistics, infrastructure they have what is the IT this one and all that is basically matter .

So that they can affect your supply chain so there are issues outside of your supply chain which are which basically are called the investment effort, investment climate affect your supply chain .

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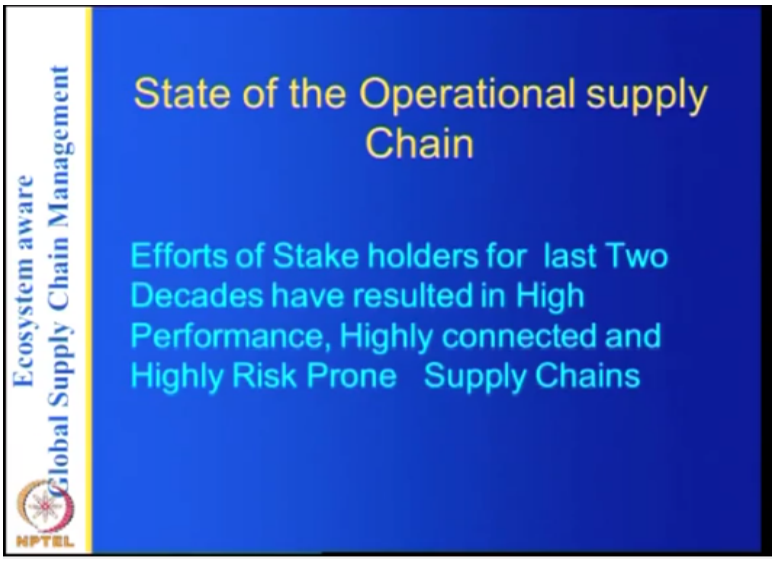

So what is this state of operational supply chain today efforts of stakeholders for the last two decades has resulted in high performance ,highly connected and high risk prone supply chains now this is the one that has happened in the sense that since these are globally dispersed and each one is trying to contribute to the other and they are all connected by internet ,they are all connected through logistics suppliers and people want to imitate the kind of just in time, the

things even for global supply chains they do not want to keep the inventory and these are the kinds of things they wanted high performance in terms of lead time cost and so on.

So this is all they become very highly connected highly connected in a sense people have developed clusters in high performance clusters in countries like in China ,like in India and so on either whether it is a service cluster or a manufacturing cluster but then what happens with all this high connectedness it becomes high risk if something happens to like not disaster strikes a place and if it has a very big cluster let it be auto cluster or electronic cluster then the whole electronic industry or the auto industry in the whole word gets affected.

So then people have started doing the globalization and making the supply chains highly connected well they basically did not care for the higher risk prone or the fragility of the supply chain because of the high connectedness and now today what people do is because of the higher risk people try to manage the risk as an afterthought so they have a risk officer and so on in the companies and a lot of times that the global supply chains are getting affected because of some events somewhere in the world.

However trivial it is and the efficiency gets this one in other words what when some unforeseen event happen somewhere in the world like a super fire in a suppliers factory then that supplier is supplying something some component which is critical and the whole production gets deleted so you will lose to your competitors because your competitors are sourcing from some other supplier and so on so these are the kinds of things that can happen with the global supply chains today and they are happening.

If you look at the literature, newspapers and so on like whenever there is a tsunami last time in 2011 this tsunami there were lot of effects of this so there is a need for the supply chain redesign so what we are saying is the supply chains were very well designed of the two decades of hard work.

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And they are well designed think taking into account just the supply chain aspects of the this one in other words they are worried about the inventory, they are worried about the deliveries, they are worried about the quality of the product and the cost factors and all that but when it is global and each supplier is corrected by their own ecosystems by factors extraneous to the supply chain such as political, economic climate regulations, delivery infrastructure in the locations of the partners changes in the availability and cost structure of resources on host of others.

Now is it possible one thing is to take or a pin to affect all this as an afterthought like an exceptional event and so on but then when an event occurs every day it will not be an exception anymore it is a part of your operational procedure so when it is affecting your operational procedure you need to take those things into account and redesign your supply chain that is what we are trying to do here .So redesign of the supply chain that was taking into account all these factors is a necessity .

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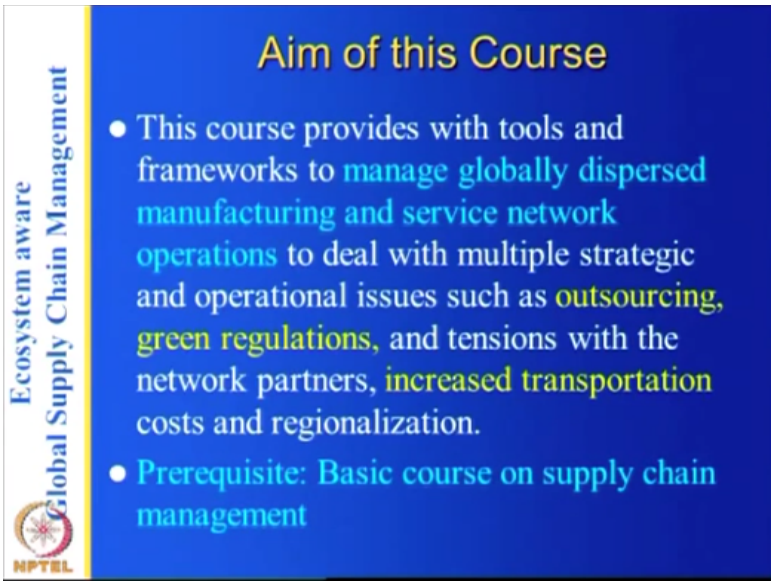

So that is the aim of this course the aim of this course provides us with tools, frameworks to manage globally dispersed manufacturing and service network operations to deal with multiple strategic operational issues such as outsourcing, green revolution regulations and tensions with network partners, increased transportation costs and regionalization you can answer a lot of other things like currency fluctuations, you can add piracy ,you can add terrorism and all that so the point is that you have the supply chain which is well managed and it has high performance in terms of costly time and so on.

You are able to supply to the customers whatever they want whenever they want wherever they want but if some unforeseen think happens then either the quality of the supply of the products offers suffers or the lead times suffers or the costs suffers who will pay for the extra cost the customer or the company so there are companies because of the extraneous events which were closed down which went into bankruptcy.

So this is where the importance of this course is and prerequisite for this course is a basic course on supply chain management because we are not going to deal with the supply-demand matching we are not going to deal with the inventory control and all that.

So we assume that all that is done but the question is it necessary to study all this to understand these basic requirements may be may not be if you have an idea if you are a supply chain manager doing all this but you have not done the basic course but still you can get benefit from this particular course so let us see this course is in 5 parts.

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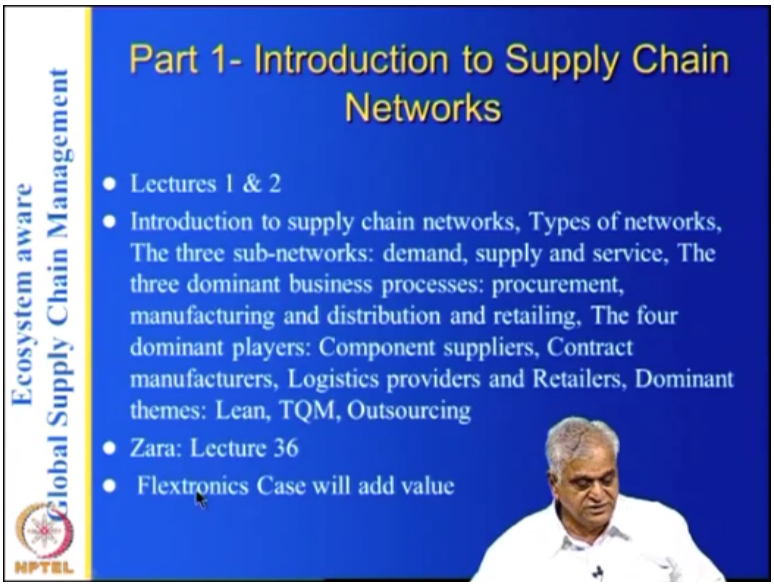

So the Part 1 is introduction to the supply chain networks so we give an overview in lectures 1 and 2 of the supply chain networks I mean this overview is special here I mean this overview is useful for following whatever we are doing hence forward in the course part 2 to 5. so we talk of a type of network their global or their local their regional kind of thing that affects because if they are global then the across countries you have customs and all that, if they are local there are no customs that still there is a transportation .

That the transportation is either truck by a train but it is not ship one and the three sub networks there the demand supply and service networks in other words the supply network is from the suppliers to the manufacturers the demand network is from manufacturers to the retailers and the service networks is after sales service .

Now these are the three sub networks which are important and three dominant business processes or procurement manufacturing and distribution and retailing so we are getting here giving a higher level view of the supply chain what are the processes what are the sub networks and who are the dominant players the dominant players or component manufacturers contract manufacturer logistics providers retailers and dominant themes or lean total quality management and outsourcing .

So this basically are the three ones that are called high-performance are why do you outsource you outsource for cost advantages you want to reduce your costs so the cost of doing outside

plus transportation plus other thing is cheaper than doing it yourself or you may not have the core competency of doing something but that part is required in your equipment like for example the Intel processor you may not have the competence to use the process you do have the competence to use the processor in your laptop but you do not have the competence to manufacture that.

So that is where you buy it from outside that is the one which basically gives you an overview of the supply chain courses that people usually give and we also give one lecture on Zara which is a case study on a Spanish fashion retailer and so on if you one wants to add another case Flextronics is a contract manufacturer in electronics one can add that into to this so let us believe it is three or four lectures is going to be the introduction and give examples of this that covers what is the introduction to this course .

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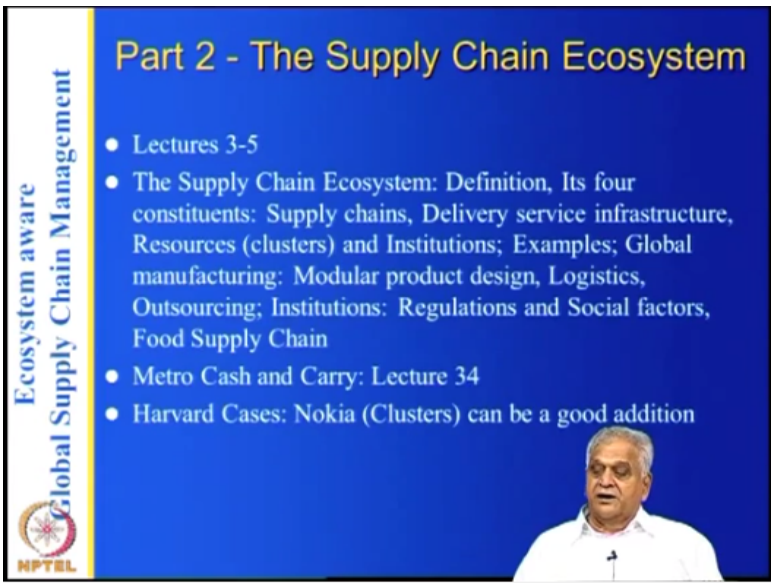

And then we go into the Part 2 basically introduces the supply chain ecosystem so the ecosystem its definition there are four constituents to the ecosystem that is the supply chain, delivery service infrastructure ,resources and institutions so usually supply chains are treated in isolation that they are affected by the resources for example for running the supply chain you need power water you need industry clusters they act as resources to your components and so on .

You need transportation ,you need ports, infrastructure and others, you need banks to give you loans to give you letter of credit , give loans to your customers so basically the issue is that the resources become an important part of the supply chain although it is not considered today now any changes in your resources is going to affect your supply chain supposing that is increase in the human resource cause which is happening in China, India and so on.

So when it happens the low cost advantages disappears so do you still outsource you have outsourced earlier went to China created all the logistics of outsourcing just because it is low cost affair but the low-cost disappeared so you still want to do it so this is the big question that comes in and their institutions are the government's and social groups at one point in time the governments were permitted they liberalize the economies and so on.

Well things change every day the politics, economic climate changes as things change the institutions or the governments may become protectionist they may increase the export duties or they may decrease the export duties then our level lies for some products they may restrict for some other products so we have changes that are happening in this but that is going to affect your supply chain and also the delivery service infrastructure it becomes an important thing and because logistics cost is about 15% of the product .

So if you have faster transportation and also efficient transportation then you decrease that particular cost so you can look at various factors and we study in detail for each of these what are the what are the kinds of effects that they have in the supply chain so here examples of global manufacturing modular products logistics outsourcing and regulators social factors and all that we study the food supply chain in detail and it is a case we will suggest metro cash and carry because they say it is a metro cash and carry is a German company.

It is a wholesaler and it try to enter more China Russia and India and in China and Russia it has no problems but in India it had a lot of problems so the institution arrangements or the laws that they have in the country become very important they can become stumbling blocks in case of metro cash and carry everything is perfect in other words it connects between the farmers and the retailers it is not coming in the way of anybody.

This except some brokers and it is going to create efficiency in the supply chain but still it went against an act called APMC act and basically half its business is controlled by that and they got affected so before any country gets affected the institutions and the regulations become

very important and the deregulations cannot be taken for granted because they are political decisions and also there are cases on Nokia clusters.

You know Nokia has created a big economy for the country and so Nokia clusters could be a good example where the country has liberalized and it has invited foreign companies to get these electronic clusters and that has improved the countries this one is the positive aspect of this so when you are looking at the supply chain ecosystem you can basically look at issues like the supply chain ecosystem and the case of cases like cash and carry the learning experience is that you should not ignore the institutions.

So whatever product you are going to offer whatever business models you may have they have to be consistent with the regulations of the country where you are operating and they should also be and they should not be against the social aspects and similarly if a cluster that is created which involves lot of asset intense it involves lot of investments by companies and it has to be under return on investment takes a long time and when foreign companies come and invest it has to have government support.

And it has to show that the government what is the kind of benefits in terms of employment in terms of the total welfare of the people of the country and so on so we both the cases show the positive as well as the negative aspects of the institutions in this case so there are others you know you can look at food supply chain you could you could map auto supply chain and so on one of the exercises that we suggest here is when you are trying to do this course whichever you are working for a company or if you are doing PhD in a university.

You can map the ecosystem for your University you can map the supply chain or value chain if you are doing for a PHD program or if you are doing a research project not already research even a research project like a PhD has a beginning and an end and whatever this one you have you can basically take it to various kinds of various goals and split them into modules.

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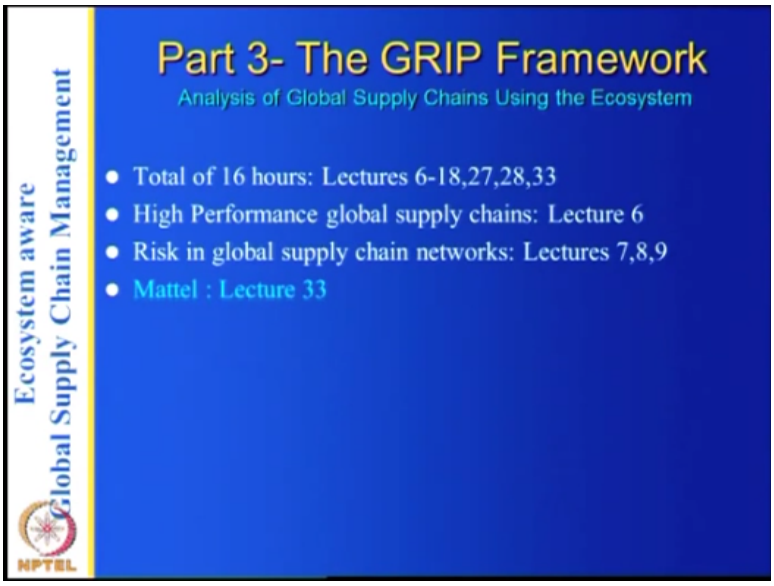

So that is about this so we have Part 1 of this course talk about the general supply chain part 2 is specifically concentrates on the ecosystem so at the end of part 2 you should be able to map the ecosystem completely and then there are examples in the in a lecture about auto, food and so on and also logistics, telecom so you take any vertical that you have healthcare it is possible to map the ecosystem then what do you do with the ecosystem you should be able to do.

I mean they are following engineering principles you should be able to do both analysis and design so what is the kind of analysis that you could use using this kind of framework so in other words this is the part 3 which is a very important thing because we are trying to do the analysis of using the supply chain ecosystem framework there are 60 lectures in this and first one is about high-performance global supply chains.

Now usually the performance of the supply chain you start with the suppliers manufacturers distributors and retailers and you usually do either simulation or queuing or anyone of this analytical methods to find out what is the total lead time and it is random in other words because the events are random you can find out the mean the distribution of the lead time you can find out and mean and variable variations of the distribution .

So we always want to have whatever the mean is you want to minimize the variation we do not want to have too much of variation in terms of the lead time and similarly in terms of the cost you want to minimize the cost but you want to have the cost advantage here so but the point here is the lead time now depends not just on the manufacturing times and the delivery

times between the stakeholders, it depends on when we are going to a customs through a port it depends on the port authorities, it depends on the customs clearances and it depends on the papers .

Because there a lot of paperwork that is involved when you are doing the customs there are 180 documents need to be signed so you have to look at what are the kinds of documents that are needed if document is missing then it is get delayed so there are times sometimes on the averages things wait for from 8 hours to 8 days or even 15 days at the ports once it is cleared it has to be loaded onto the ship or not once it comes to the destination it has to be unloaded and again have to go through the customs.

So you have to consider the customs duties this one another thing is that in terms of the resources is the labor productivity well some labor highly productive, some labor are low productive , so it will take more time for some people to do the same task and also the if you want an lcd clearances the letter of credit some banks may do it online when you on the run your mobile some banks may take a couple of days.

So the issue on making and also the finally the delivery mechanisms I mean in some countries the infrastructure may be bad the roads may be bad so for a truck cannot travel more than 40 kilometers an hour and whereas in some countries it can go up to 200 kilometers an hour so these differences in the environment or in the ecosystem will affect both your costs as well as your lead time you have to take these things into consideration.

When you are doing the so called lead time or cost estimation so this high-performance global supply chain in this lecture we consider these aspects and of course there is a risk in the supply chain we have 3lectures on the risk and a Mattel case now the risk in a supply chain can come from usually the risk in the literature on supply chains is considered either the supply risk or the logistics risk or a financial risk and so on.

I mean there are papers or research papers or books which talk about their various kinds of risks that can occur but is it possible to identify all the risks and which source they are coming from and how to mitigate them that is what we are going to do with this these lectures now given the ecosystem this one .We have four elements in the ecosystem and the risk can come

from all the four elements it can come from the supply chain it can come from the resources it can come from the institutions which are government and social this one.

It can come from delivery now in terms of delivery it can be late deliveries it can be defective deliveries it can be piracy in terms of the government's might have suddenly turn protectionist they may favour their local companies and there could be labor strikes or can be social groups inside can agitate or ignite your company so there are several things that can happen this could be their events but they could happen.

Whenever they could happen you should identify and try and mitigate them and see if they can if you can manage them not to happen and there are always resource risks, the resource risks are your labor productivity and your financial risk that is if the banks have problems then you get into problems and also there is power shortage water shortage increase in your foreign exchange or decrease in your foreign exchange value.

These are all risk and the risk could be either deviations that small race which you can manage or it could be disruptions in other words there is a truck failure it will disrupt your delivery that day or it could be disasters there is natural a tsunami somewhere or a thunderstorm which has wiped out the roads and it will take a month for things to come in to normalcy so depending on all this it is needed that you talk about the risk and identify this.

Now people may say everything is risky because any product or any service any human being you can get sick and can die or something but the point is you should be risk aware that is the risk awareness is the one that creates that is created in these lectures so if you want to mitigate them or if you want to avoid them what is the kind of thing strategies you have this is like diagnostic tests that a human being goes both you cannot avoid diseases you are careful but you also test whether it is possible to avoid it.

So this is basically the mitigation strategies which are highly important and of course the ecosystem framework for renovations now this is an important topic because people think that innovations can happen only either in products or processes but innovations can come from resources .

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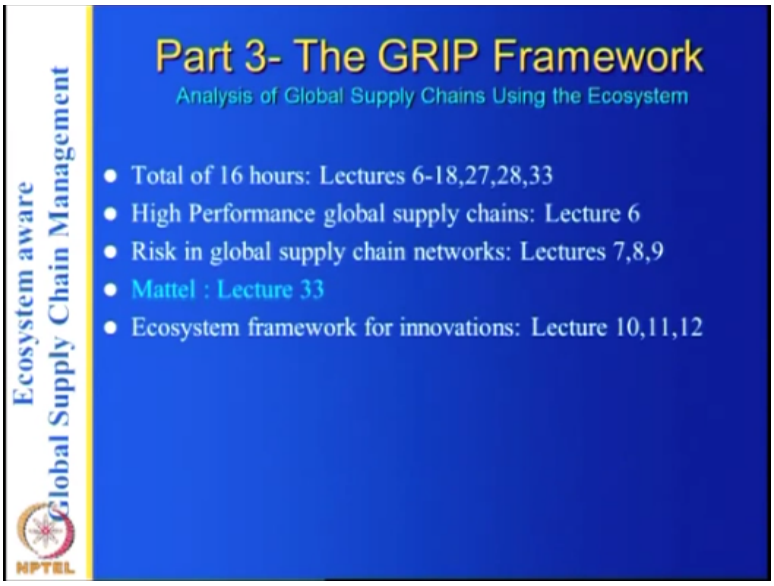

For example Google has created a search engine and it has written or created a website so what are the kinds of things that you have come because of the search engine and also the internet you have Wikipedia which is online which is free you have search engines where you can search for anything you have Google scholar you can get any paper almost free if you are researcher and also there are several businesses which are built out of this search engines.

For example online advertising if you want to search for a product you can search using Google search so basically these resources which come they create innovations so i have given early examples of the recent innovations that have affected and similarly the deregulation coming from the institutions which is an innovation for example in several places the airlines got deregulated you have things like Southwest and others who came into play and of course it creates competition for others.

But it is the benefit to the people that is the regulation of telephone telecom everywhere in the world was controlled by the government because it links the information but it is most of the countries have deregulated the telecommunication and you can see the effect of that and also there is technology innovations like the mobile which has revolutionized all our lives the TV's on others.

So other business model innovations that come out for example home deliveries and innovation you need not have to go from where you can on online order online and then you know pay online and download your ticket you need not go to the airline office so there are several

innovations which are committed not have to be product process innovations and there is also need for co evolution of the innovations innovation by itself.

For example containerization did take off the big ships were built and then the trucks were able to carry all those big containers and so on so any innovation test it has to a wall so in our opinion the co evolution of the innovations happens through these four elements of the ecosystem for example the modularization of the products is on innovation in products that has led to outsourcing how it is because you have a modular product which is specified and that can be manufactured anywhere and there is a process which is standardized to manufacture it and there is equipment that you can use .

So you can buy the equipment from say somewhere and use the process has some money and use the technologies to manufacture in your house and supply to some big company so the outsourcing to low-cost countries has come from as a result of the modularization of the product and because of outsourcing they have liberalization and because of liberalization there is the logistics so several things happened. So what is the co evolution here so the innovations is another important we need to spend time the lectures on this.

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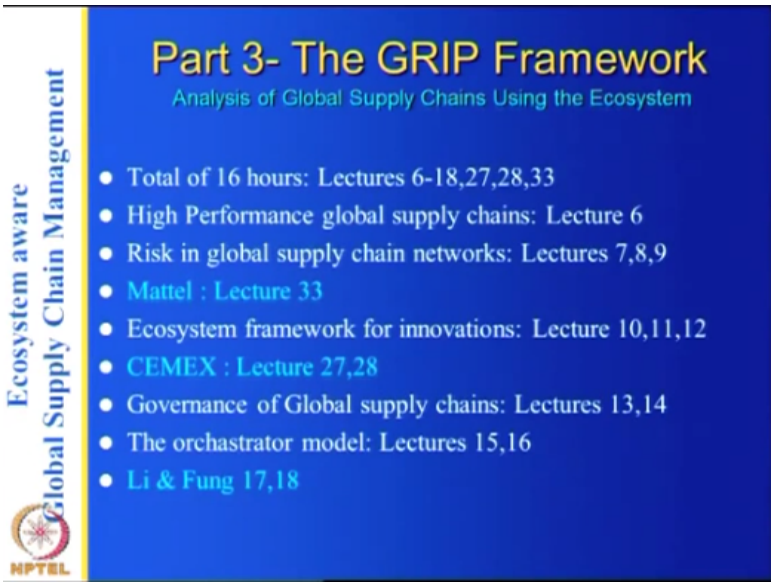

Let me give an example of CEMEX which is an example of all the three it can it is risk averse and it has lots of innovations of its own of course the governance which is very important

topic now if you look at the world vertically integrated supply chain I have mentioned that although it was Henry Ford who basically invented the assembly line and who is which are revolutionized the auto industry and other industries as well but it was Alford Sloan who has this governing hierarchical governing structure which was came in to being.

Now we have globally despised supply chains but who is the manager who is the boss who tells who that is missing so in our governance chapter which is highly original we have three two lectures and we have also an orchestrated model I am not saying that not companies there are lots of companies which are operating but the fundamental principles of governance is not taught.

So these four lectures and the example of Li and Fung which gives these six lectures are the ones which will give you the total this one so in terms of what we call the Grip Network which is the performance innovation risk and governance using an ecosystem is fundamental and basically if you are doing any of this I think we should go through all these 16 lectures with the examples and that will give you a fundamental understanding of what the ecosystem .How useful is the ecosystem well the Part 4 is a global redesign.

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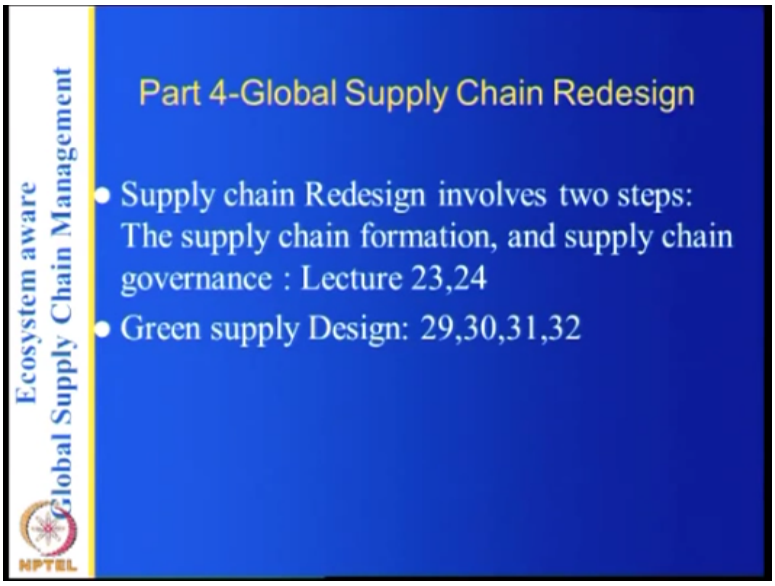

How do you redesign the supply chain it involves two steps one is what is called supply chain formation and second one is the supply chain governance now supply chain formation is basically like collecting all the information about all the people in other words you are in auto

industry you require various components so you will do research and find out which country has high quality suppliers which can whom you can trust who will deliver products on time at low cost to your design .

Design is yours and they should manufacture and give it so on and of course in the process there could be IP theft and all that but still you have to collect each of them from India, China from Vietnam whatever all the countries for each component and you should find out whether what are the kind of equipment they have in which country they are living what is the ecosystem of that what are the risk that you face if you source from them.
So once you collect all these information for all the components all the logistics providers and so on then this is like collecting the base information that is the supply chain formation stage then the next step is you have to for each order you have you want to supply say 1 lakh shirts of 3 colors white, blue and red to somewhere in US and where do you select various things and at the end you should design it.

After design you should outsource look for the yarn get the cotton get the cutting and then sewing then ironing and then sending it to the retailer in the US so for each of these you have to select the partners so that is the governance mechanism is partner selection ordination and execution so people call this control tower like in the power systems as well as in the traffic control you have a control tower which basically gets all the information and managers all the exceptions if they occur .And we do the green supply chain design.

It becomes very important topic that is because supply chains are responsible for the G hg gases what is the supply chain any product and service that you generate you use this is behind that that is a supply chain so if you want to reduce have green products which means you should have a green supply chain and if you want to have a green service like transportation. Then you should have a green supply chain or a green service.

So basically it becomes very important green supply chain design we had 4 lectures starting with the fundamentals of green and then use the design how to select partners and how what are the kind of governance mechanisms and the green supply chain has for both forward and backward supply chains because green means less resource usage recycling and there is carbon trading or less g hg gases greenhouse gases and so on so all this requires knowledge one degree our ecosystem model is fundamental.

So the green supply chain we have the ecosystem map and based on which you can do the design so once you do this one of course there is the part 5 which is applications well in the applications we have in the book of course.

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We have only three one is the food supply chain and food security where four lectures on that this is important particularly in countries where huge populations and food supply chain is fragmented and we also talked about food security and how to supply food how to use ICT technologies to improve for security of course we did the green supply chain design and smart villages now the big thing here is this that use your ecosystem.

Framework useful only for supply chain saw service chains the answer is no it is much more general you can have eco system framework for villages for cities for regions for countries for universities and so on how can this happen because you are always talking about the supply chains here so the fundamental thing is that if you look at any village or city what is a city what is a village what is a university it is a collection of services the bundle of services is a university a bundle of services is a village a bundle of services is a city.

So when we were when you generalize it in this way and if you look a city or a village or a university as a bundle of services or a hospital then you can see that you can have the ecosystem and instead of having one service join you have service chains and all these service chains are governed by resources which in the university hospital or will a check it

has the institutions which are regulations and it also has the delivery mechanisms and of course multiple service chains and it becomes more complex but sure it is more complex in village or city.

But it gives you a framework which is orderly and general to deal with to design a village we have presently present this smart villages and cities and of course there is a location selection location selection problem is if you want to select a supplier of you want to select this one then you have to do the location selection so there are four applications and one can have other applications doing this and these are representative applications where you can use the this one so what we have so far.

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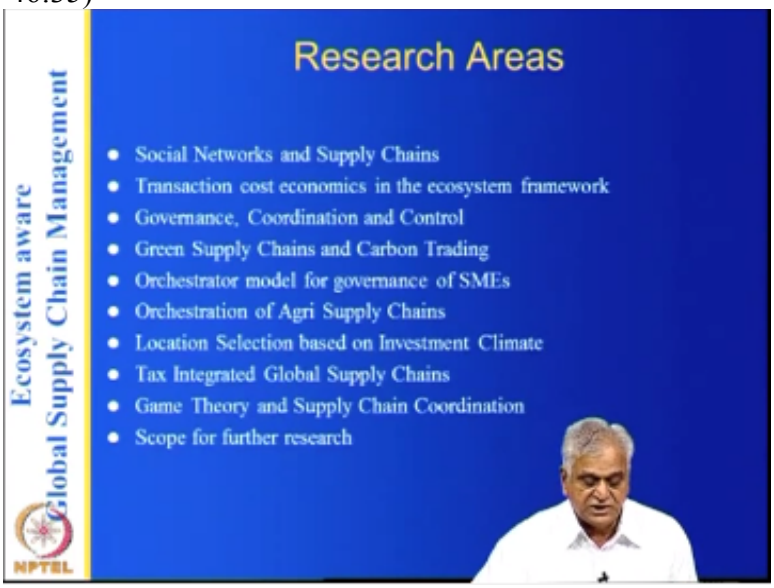

Is that you know this gives you a big a big this one about the ecosystem and its applications well if you want a researcher you could get into the search areas or like social networks and supply chains transaction costs economies in the economy echo system framework governance coordination control in other words these are for a generalized networks governance coordination control are very important clean supply chain and carbon trading orchestrated model for agree supply chains you know their companies like all I am international.

Which basically are doing well but they require help location selection based on investment climate basically there are all kinds of reports from World Bank and other consultants and so on but if you follow the ecosystem framework those reports could be better tax integrated

global supply chains how do you how do you manage your supply chain integrating all these factors ecosystem factors is it possible to develop a mathematical model the answer is yes.

But one should or that when you are doing optimization with the kind of parameters that we have like resources governance and so on you may not have numbers all that time you may have opinion expert opinions like for example if the governance good you cannot get give a number of this you can say it is good it is excellent and so on so there could be some subject to this one so you should have mechanisms or models either analytical hierarchy process or some others the machinery techniques where you can use both textual and data this one and then do this a little water scoffer from the research and all this gain theories of legend coordination and all that.

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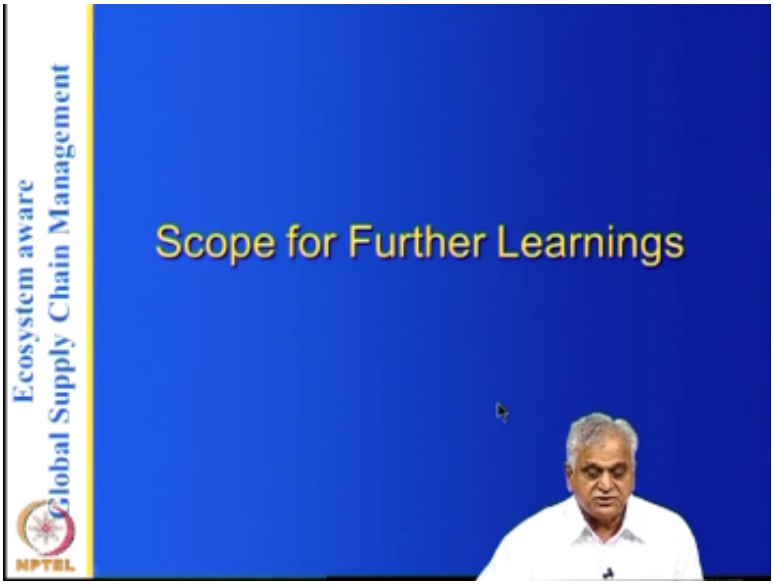

So this several scored for further learning.

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So for example the five sterm forces for a policymaker what are the kinds of things that you should worry about this call that is what is called stem people worry about science technology engineering and mathematics but according to us our framework it is term which is science technology engineering regulations and policies and management basically comes out of the governance.

So these are the four kinds of importance where you know they are five kind of five forces which basically go on any particular supply chain or a city or something you should consider all these for innovations as well as for configuration.

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Of course what is ultimately what do you see after at the end what should you ask question now if you want to get a supply chain configuration given the government regulations the investment climate vertical space the company has to tread carefully with the right products services planning strategies such as the location partnership decisions and business models to succeed now if you go through the whole thing and then the discussions that in the lectures you will find that the this is the summary of all this.

In other words whenever a company want to start off what are the products what are the services what are the business models that is going to follow so succeed you should take it to account the government regulations the investment climate the vertical space also the resources that are available at the this one it may look it may have common sense but it is not being done and this particular this one gives you this close gives you a analytical way of doing those kind of things.

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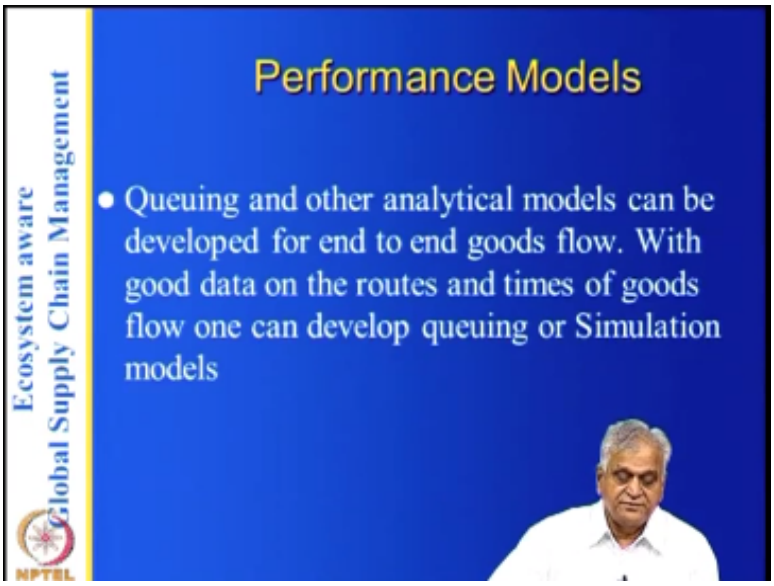

The performance models for example they are queuing and other analytical models they can be developed for good slow.

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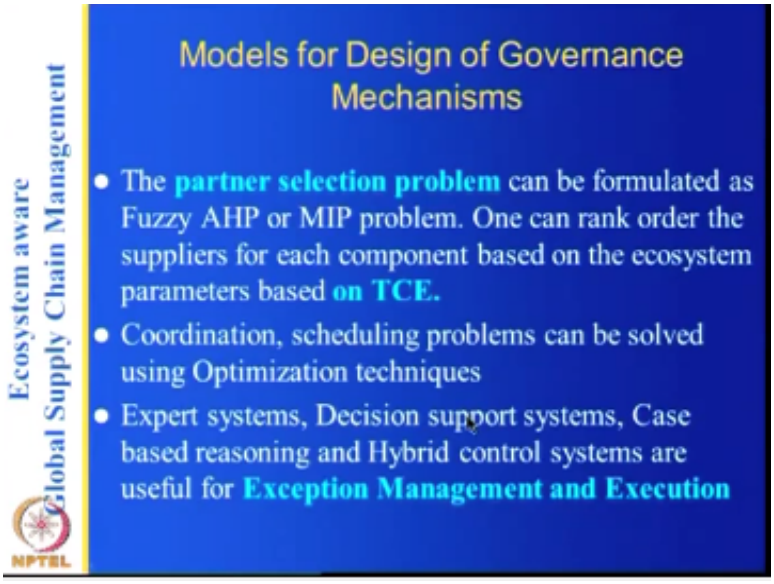

Their performance models were design of governance smaller mechanisms you know there are partner selection coordination and scheduling there are a lot of work that can be done the risk management and all that.

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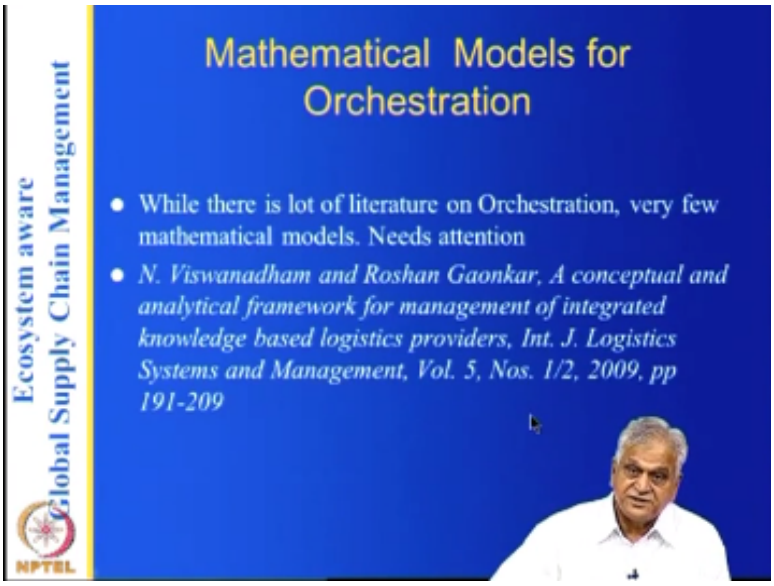

And also the mathematical models for orchestration you know orchestration is fundamental but it is a lot of attention you know we have some papers which we started this work some time ago.

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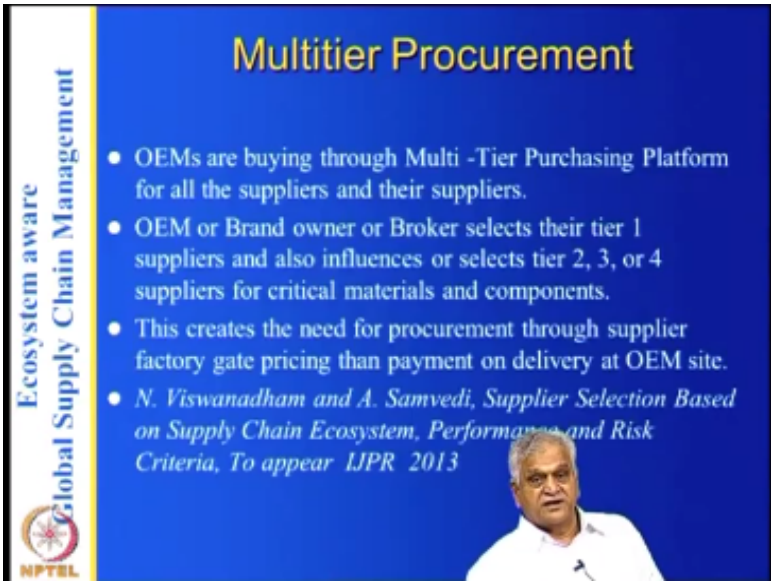

And multi tier procurement this you know in other words the volumes are buying from suppliers to suppliers to suppliers and so on so if you look at the layers of the supply chain there could be 10 layers 12 layers and so on and starting from the raw material till the OEM and so on but then one can see the risks you know if one of the lower tire suppliers poisons

something I use as a cheaper material for a cheapest steel which can affect your aircraft or your automobile then as the boy M is the one who is responsible for it so multi-tier procurement and as a platform becomes important.

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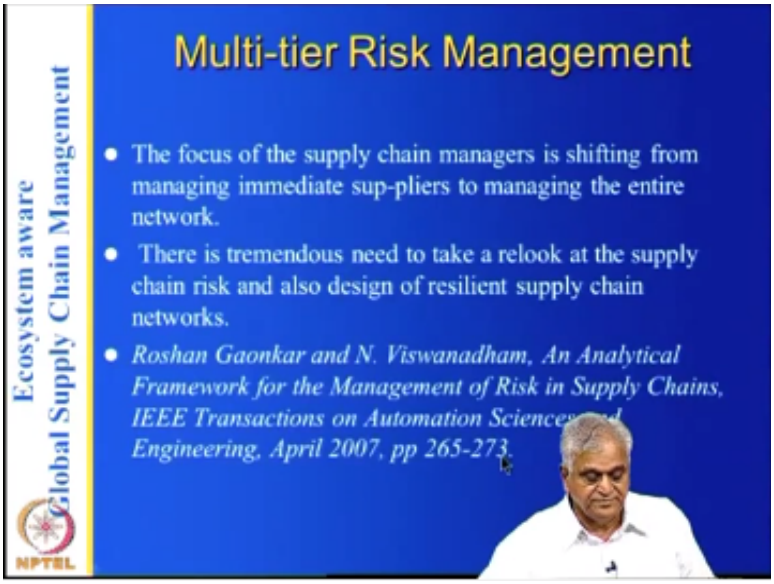

And similarly the multi-tier risk management in other words the focus of the supply chain is shifting from managing immediate suppliers to managing the entire supply chain network.

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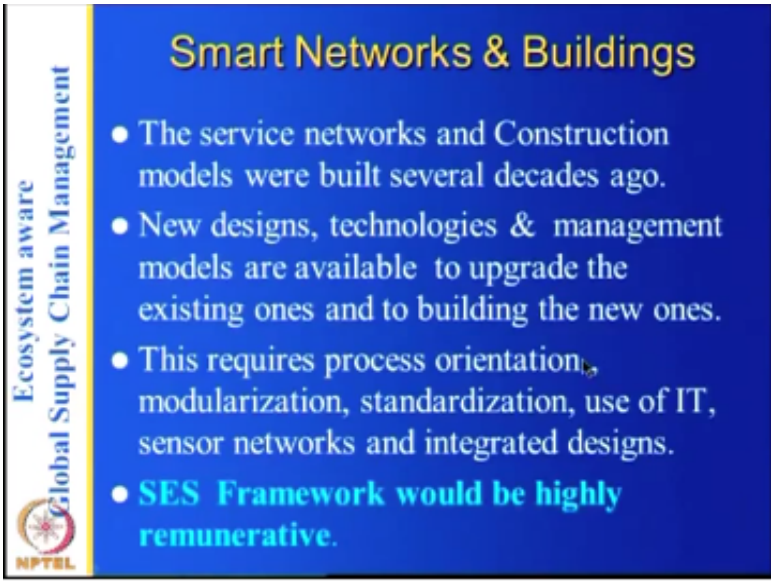

So smart networks and buildings you know the service networks and construction for built several decades ago you know you in today if you look at the construction you know people still get the rock this one and then they get the by the wood and make the doors windows and all that but is it possible to standardize these things and also you have the buildings where which consume lot of power right from pay to everything affects your power so can you make green buildings can you use less resources can you use less power to maintain your buildings and so on.

New designs technologies and management models are available to upgrade the existing ones and to build new ones so this can be if you if you basically look at the ecosystem model for a smart building smart network and then the innovations that are possible you can design the whole thing this requires process orientation modular ejection standardization and so on.

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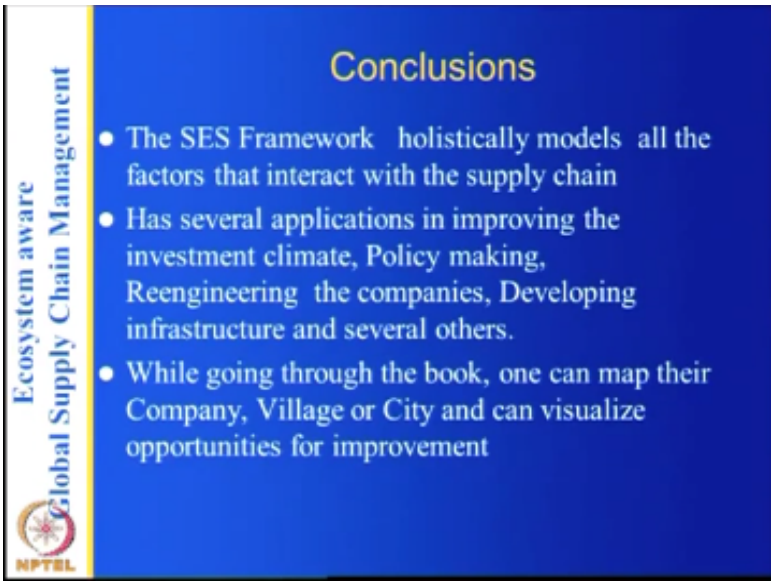

So to conclude this you know here we have the SAS framework elastically models all the factors that interact with the supply chain so in one page when you look at the SES model in one page you have the entire model all the factors that you need to consider and that is a big help you may know them all of them separately that putting all the experts together at one place at one table to discuss that can produce fireworks.

So has several applications in improving the investment climate policy breaking the engineering the companies developing infrastructure and several others and while going through the book one can map the company village or city and can visualize opportunities for it so if you if you can look at every organization of the human being on the work that you are doing as a bundle of services then this will be helpful thank you.

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