Indian Institute of Science
Bangalore

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Global Supply Chain Management
Lecture -09
Supply Chain Risk –Part 1

Prof.N. Viswanadham
Department of Computer Science and Automation
Indian Institute of Science
Bangalore

These two lectures this one and the next one is going to be on the supply chain risk.

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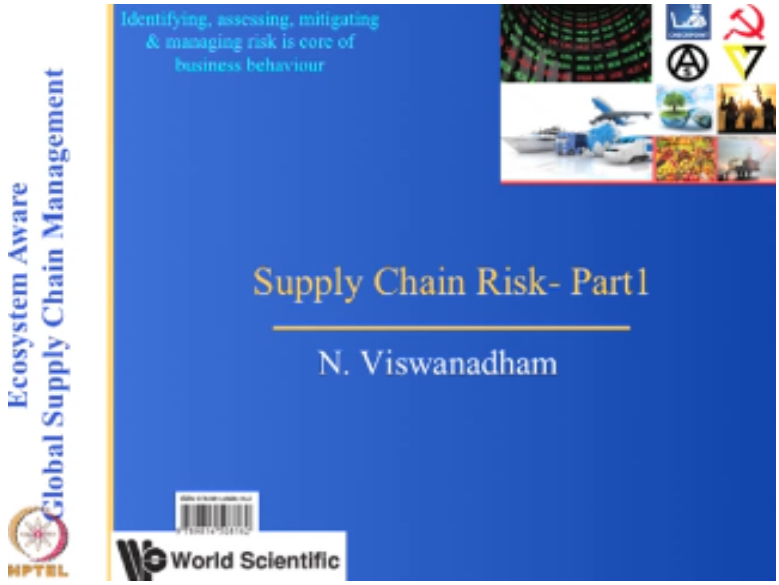

Now this is a very important subject and there are a lot of people , who are worried about their supply chain functioning and the risks the supply chain is facing so it is basically the supply chain risk is identifying assessing ,mitigating and managing risk is a core is the core of business behavior so most of the businesses are now feeling the heat of supply chain risk as we have seen earlier that the ecosystem parameters several ecosystem parameters are causes for the risk of in the supply chain and how to mitigate the risk how to handle how to come out of the risk behavior is the is the attention of several people.

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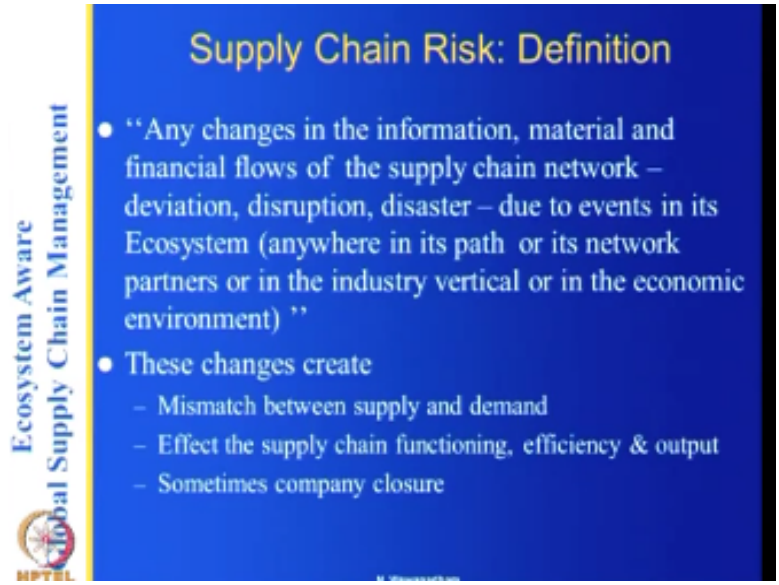

Today so what is the supply chain risk let us define it this one any changes in the information material and financial flows in the supply chain network it can be deviation that means the

small changes or it can be disruption that means big changes or it can be disaster could be that means the entire IT network or entire logistics network get disadmitted due to the events in its ecosystem in other words the ecosystem ,has four parameters including the supply chain which is the resources it can be in the institutions which are governments and social groups and also the delivery mechanisms so the risks can come from any one of these elements anywhere in its part or its network partners are in the industry vertical or in the economic environment.

So you can see the wide range of factors that can affect your supply chain so it can be the economic environment in men's you know the crisis in Europe today if I natural crisis for sewage some countries are facing and if they are as a supplier in those countries then you have a problem the supply chain is a problem there could be industry vertical problems in the industry vertical for example if you have say Barbie dolls in the dolls there is let in the paint of the dolls then you know all the doll vertical gets affected and similarly.

The mad cow disease or h1n1 these are the kinds of things which will affect the entire industry vertical so basically one has to look at the all the factors that will affect your supply chain so these changes will create whatever what how do you feel the effect of any risk on a disruption deviation or a disaster it is basically mismatch between supply and demand so you have basically if there is a there is a demand it a demand gets affected. Because of some credit crunch or some other things that are happening in advanced countries so there is more supply and there is a demand there is a mismatch so there are lot of lot of supply.

Which need to be jumped but on the other hand if there is a lot of demand and there is their suppliers have a problem because of some natural disasters like tsunami what happened in Japan then there will be a lot of demand and the demand cannot be met because of lack of components and so on so basically this will create a mismatch between the supply and demand second thing is it affects the supply chain functioning efficiency and output you know in terms of if there is no supply of components then the manufacturing factories need to be vacant and people will be out of jobs and also.

There are several other things that can happen and sometimes these can result in company closures so if companies are not careful and if they do not meet get the rest or try to attempt to handle the risks properly then they may it may result that they have to close their companies so this is basically some that is where you can see that the three flows in the supply chain the information material and financial flows any of these flows are affected by the deviation disruption or disaster from any one of the partners or any one of the this one you can see the number of factors that can create risk in your supply chain and this can create havoc.

In your supply chain so it is very important that one studies how to handle the risk how to mitigate the risk what are the ways in which you can you can basically handle the risk and come out of the situation so but again it is very difficult to handle all there is and it is very difficult to

mitigate all the race but you should be able to manage the risks so we will deal with all these factors.

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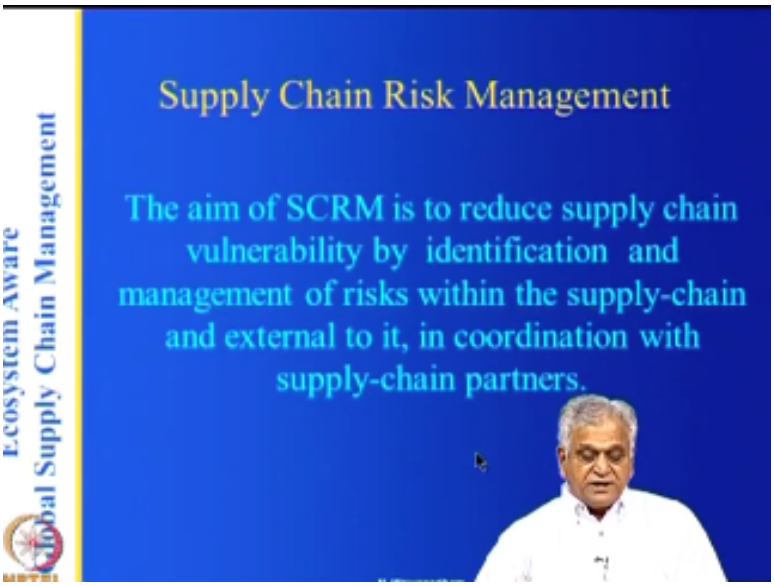

In this so what is supply chain risk management the aim of supply chain risk management is to reduce the supply chain vulnerability. Their supply chain becomes vulnerable you want to reduce the vulnerability by identification and management of risk within the supply chain and external to it in coordination with the partners.

So you are not alone in this for example, in the reason financial crisis where were government's trying to cooperate with the companies to basically mitigate the financial risk that the companies face so for example , United States government has helped a lot of auto companies and other companies to come and also the financial the banks to come out of the crisis so the issue is that all the supply chain partners are involved and they have to coordinate how to handle the risk the first point is identification of the risk and second point is to identify what is the magnitude of the risk the third one is you have to coordinate with other peoples to other partners to handle the risk.

So this is it if the coordination comes only after the risk has happened this is after the fact then it may take a long time to this in the meanwhile the disaster could occur and the supply chain breaks do not but other hand if you plan about the risk management you know you have a list of all the possible place small big and large so those risk and for each of them. Whenever they happen whether the probability of occurrence is large small or whatever and if you have ways of dealing with them and I written down then and then you can plan for handling the supply chain risk that is supply chain risk management.

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So supply chain risk in an ecosystem framework what is it so you have risks in a global supply chain.

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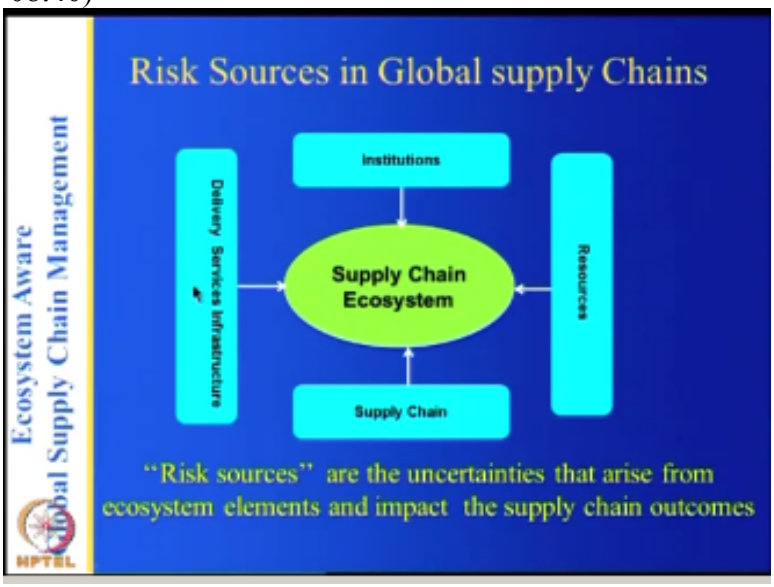

You have written a global supply chain and that is therefore as we saw early earlier that there is a supply chain their resources their institutions and the delivery infrastructures and all of them can contribute to risk we are going to see how each of them contributes to risk and what happens is the risk sources or the uncertainties that arise from ecosystem elements and impact

the supply chain outcomes, so what is the outcome of this obliging outcome of supply chain and supply demand magic the efficient deliveries and keep your keep your finances okay ,and so on so basically whatever happens in the risk sources are the order uncertainties.

That happen supposing the price of oil increases the resources or the labor goes on strike these are the kinds of uncertainties that arise in the equation the resources if the institutions government turned protectionist and there is a government change and so on so those are the kinds of risks, that the institutions can create there can be a disaster the ship cannot sink or there could be some problems with the shape or there could be piracy that is affecting your deliveries and so on so these are the kinds of risks that affect the delivery infrastructure so basically if you look at this all these uncertainties that arise from the ecosystem elements and impact the supply chain outcomes there are the risk sources.

So first of all you have to diagnose the sources , what are the sources of risk once you know the sources of risk then you can map what is the effect of these resources then you can try to mitigate the risk so first of all you need try to know.

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What are the risk sources and so on so what are the supply chain race we have say these four elements let us see very briefly how each one of these contribute to risk supposing you take the supply chain and there is the location risk in other words in supply chain partners are located across various parts of the world and there could be a tsunami there could be an earthquake.

There could be a thunderstorm or there could be a war or there could be economic crisis several things can happen in that location so when the location gets a word that could be a power crisis that could be water crisis when any of these things affect the industry or the suppliers who are located in that this one so whether the location risk that comes in that is outsourcing risk that is

supposing you outsource a particular component to your partner then there is the partner risk in other words the partner he may not he may not have he may have equipment. Which is outdated so he may not be able to supply modern high quality components and he could probably give counterfeit components in other words they are not of good quality?

But they look alike but they are not this happens a lot in the pharmaceutical industry there could be inventory deficit there could be bleach of crust the breach of trust comes because if he is there is an intellectual property that is involved because when you are giving outsource a particular component manufacturer to a component to a supplier then you are going to share the designs with them well he can share the designs with your competitor and there could be an intellectual property theft so I will give you examples, of the risk of these partners later.

Where the partners have one who once you outsource then the partner that could be a breach of trust or an IP theft if not even if they even if it is legal then there is a partner risk that what notes takes over and you basically marginalized then design manufacturing defects counter feed into entry deficit that is it is a promise some inventory and because of some reasons there is the inventory deficit the inventory deficit could come because of wrong counting it can come because of theft and other reasons there delays or bankruptcies of suppliers supposing the day the supplier has a strike of his this one or he has bank crisis of financial crisis and the bank is not giving loans to him so but whatever reasons there could be delays on.

This set a loss of demand due to economic downturn company bankrupt is and what then war or this downturn happens there a lot of demand because of credit queues credit squeeze and break down of machines power water where houses and offices these are the kinds of things that can happen from the supply chain the second thing that is the real resource related risk one is infrastructure deficit you do not have say good words there could there no good roads and so and so this becomes an infrastructure deficit and industry clusters quality of your structure you have clusters all right.

But they are not of high quality and then their labor unions who create problems there is a credit squeeze that comes from the financial this one energy water and talent shortage so you have the noon the resources like naturally so search shortage and there is talent started salad shortage is being talked about now in a varieties of is you do not have management talent you do not have skilled labor who are trained to work in retail shops or in manufacturing and so on so nowadays what has happened is either agriculture or manufacturing or any service verticals ,have the talent of the human resources have to be technologically enabled so once the technology they are not technology sensitive then it becomes their efficiency goes down.

That is the technologies and stairways use of computers use of SMS use of telephones and so on you should be able to officially emails and so on you should be able to communicate with people and not always looking for phase two phase instructions of course social unrest war natural calamities is certainly affect the resource related risk then of course the more important

thing is the rain raw materials, you know mines and other raw materials there is the price increase for example oil has increased to alone something like $150 battle sometime ago and it came down to forty dollars later.

And there is also increase in the logistics costs logistics costs can increase because of the increase in the price of the trucks there are taxes and other kinds of things so diseases in livestock this is the mad cow disease kind of this one h1n1 these are all bird flu these are all the this is just that will affect the livestock and of course the contamination of milk contamination of meat and other kinds of things so basically the it is found that in UK other places the beef is contaminated with hearts meet up to twenty %.

So basically did particularly in the food area and the decisions in livestock and contamination will affect and they could be positively dangerous.

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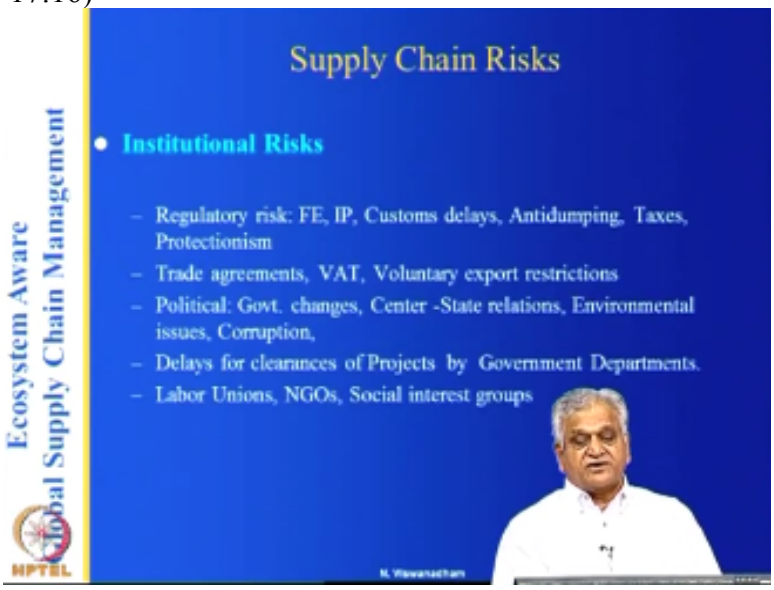

This well let us look at the recently institutions that is the government's and social bodies regulatory risk a foreign exchange foreign exchange fluctuations happen and this one exchange fluctuations happen because the US dollar which is the prime currency and they may have it may go up and down an intellectual property the for example the government may say may shut Assize to theft of intellectual property and there is the customs delays aunty dump anti-dumping is although it is permissible.

To import some of the material they at the port it delays or it refuses the entry of second goods saying that it is going to affect the local industry so in case of financial crisis or when the economy is not doing good governments can do the anti-dumping so the supplier who is coming to the who has come all the way to the port after transiting the ships they will find that the anti-dumping is basically lies and worked and they say you get lost you we are not going to

going to allow you into your components into this of course taxes increase protectionism these are all the kinds of things that now the regulator this there are trade agreements that is the value added tax voluntary export restrictions.

This yesterday I mentioned this voluntary export restrictions are they accompany the country itself says that we are not going to export more than this or we are not going to import more than this particular this one for this material or this vertical political government changes center state relations environmental issues and corruption these are basically in countries like India united states and other places there is the center government which make certain rules and that the state government. Which basically implement some of this for example if you have a special economic zone the approval is given by the central government but the land and other facilities are to be provided by the state government and similarly.

The case with a retail if they are in the case of a retail the central government gives approval for the fun direct investment but the state government has to cooperate in terms of the this one so basically if they there are two different parties in center and state they do not get along than you the companies face the heat and then there are elections in most places in a democracies and the government changes over four years or five years so changes in the government could affect the policies and environmental issues for example there are several countries where in dust which are initially forward there are there pacing problems of pollution.

In the water they are also the ghe castles and so on and of course corruption is rampant in most countries most emerging markets and that basically is an issue delays for clearance of projects by the government departments well this is this is a part of this one if you have a project where land is in world in other words you want to build a factory and you had to acquire the land from farmers then it can take a long time for this because they you have to be although the government can give the clearance ,you have to satisfy the farmers give them the prices properly and they can learn all this iron multiple agencies of the governments are involved and it may be delayed this one and their labor unions and she was on social interest groups.

You will find in several places several times that the non-government organizations and social interest groups for example, if it is a nuclear power plant that is coming up then there could be social interest groups who are basically going on strikes and they are objecting to this and similarly the non-government organizations so you can see that there are several institutions which also governed come by come the social groups as well as the industry groups as well as the government's that can affect create the risks.

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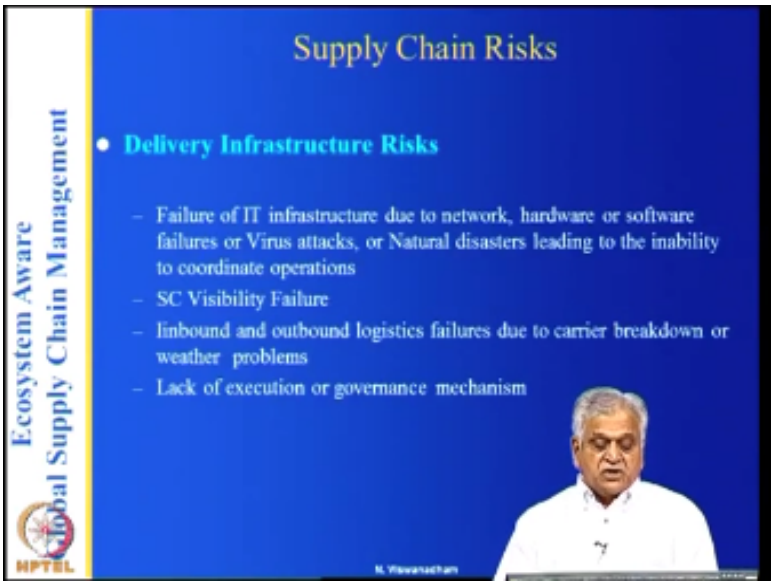

So there the delivery infrastructure is that is the logistics rails failure of IT infrastructure this is one thing that people say is a is a is one of the biggest issues that that can face.

Because now the hackers are entering into your main computer , which control the control the entire supply chain network then you can you can you can be in danger of both theft or as well as they can they can they can ruin the entire network so that you cannot function and hardware or software failures violent attacks are natural disasters leading to you know to inability to coordinate operations so we have said is if there is an IT infrastructure which is controlling very efficiently your supply chain supposing there is a natural disaster where the power supply goes off and the backups fail then your IT systems would not operate that means all your plants all.

The manufacturing units all your service units will be shut down so these are all the big failures that can occur and one has to be careful and supply chain visibility failure can happen because if you are using same sensor networks to create visibility GPS and so on so there can be failures in those inbound outbound logistics failures due to carry or breakdown or the weather problems let a lack of execution and governance mechanism . Now this is one of the issues that can be corrected but most companies do not have an execution our governance and governance mechanisms in other word the plan.

You know you there are lots of packages ERP and other packages which will give you the supply chain plants when to how much to manufacture went to pick up where to deliver how many trucks and which driver and so on and when and where to deliver and which road to take on all this is given but what happens if something happens and this cannot be executed as given who will direct there any people what to do in such patients so that is the execution here as I mentioned in the last class the Penske which cooperates with the collaborates with epact to solve the execution problem.

So we have seen that in all the four parameters so far four elements of the supply chain ecosystem the radius of various kinds of things or failures of various kinds of things can happen well whether when whether it is man-made or God made the other thing is prone to failure so in such a case I mean it is not an issue of the failures occur or not but it is an issue of how to manage these kind of risks one there are two issues one thing is to stop this from happening and second issue is to manage the risk after it has happened to minimize the outcome of the risk.

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So let us look at the what is supply chain risk management the supply chain supply chain risk management is the aim of supply chain risk management is to reduce the supply chain vulnerability by identification and management of risk within the supply chain and external to it that is why we defined it inter organization coordination of risk is a critical requirement in global supply chains.

Which are complex independent networks of suppliers customers third parties always providers and so on so this is a thing that we went through and the leaner and more integrated supply chains become the more likely uncertainties dynamics and accidents in one link will affect the other so here although we have found out that the global supply chains ,if you want to them make them leaner and melt more tightly coupled then it is possible that they are more fresh I and a more prone to risk so you have to do inter-organizational coordination of the rest is it is not it is if you are a manufacturer or a supplier if you coordinate your own race.

It is not enough you have to deal with as a supply chain or the entire supply chain need to be coordinated to handle the risk if a supplier is located someplace and he has a disaster and he has some other he is a plank in some other place he can supply from there but all the things need to be coordinated that means there should be another logistics provider it goes to another

country sport and so on so basically every all the route of supply it changes so one has to coordinate all that.

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So what are the risks in the in the supply chain so if you say risk.

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In product and value chains so if you global supply chains are riskier than local supply chains. So let us look at the risks in the product and value chains the global supply chains are riskier than local supply chains need to deal with different governments on varying infrastructure and intellectual property issues some countries are high risk the risk includes intellectual property

infringement supplier and internal product quality failure and security breaches delay or unavailability of material from suppliers due to natural disasters loss of demand due to economic downturn financial crisis etc so the high-performance design makes supply chains very fragile and they get severely affected by disruptions to transport communications.

And so on and breaches in partnerships violation of integrity of cargoes products either due to theft or damping or company proprietary information so for example.

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Let us look at what happened in Japan's this one he much 11, 2011 earthquake tsunami and consequent nuclear crisis in Japan cause shutting supplies from the semiconductors to car plants to manufacturers across the globe now what happened in Japan is there was an earthquake and earthquakes caused tsunami and tsunami has caused the electrical power shutdown and that also shut down the backup batteries.

So the nuclear plant went without power without control so there was a nuclear crisis and this has caused since the power went away all the supplies from these the suppliers were shut down for cover for three or four weeks and this location where it happened it has horse semiconductor to car parts to manufacture across the globe so Boeing face delays in the delivery of Dreamliner is the dream aircraft of boy and so their parts were manufactured there and General Motors shut down production in the US. Factor is due to shortage of parts and key parts of apple iPod 2 suddenly.

Became difficult to find see but if the problem here was these companies Boeing General Motors and apple and several others which I dint list here including Toyota and other Japanese companies they have suppliers in Japan and these are niche suppliers and it is very difficult to

replicate what the suppliers are doing they do not have a duplicate suppliers or somebody the second source where they can source these parts at least at that time so given that kind of situation then the tsunami has basically everybody has shut down so you can see the effect of the Japanese auto companies suffered huge losses tire touch upon production.

In April 2011 fell 74.5 % and while its global production declined 48 % the Honda's production in Japan fell 81 % in April and the worldwide production declined 52.9 % Nissan in Japan production declined 48.7 % and global production slipped to 42.4 % you can see the huge impact that a natural disaster like earthquake has as an effect on this applies it so basically this is what we call the location risk in the product.

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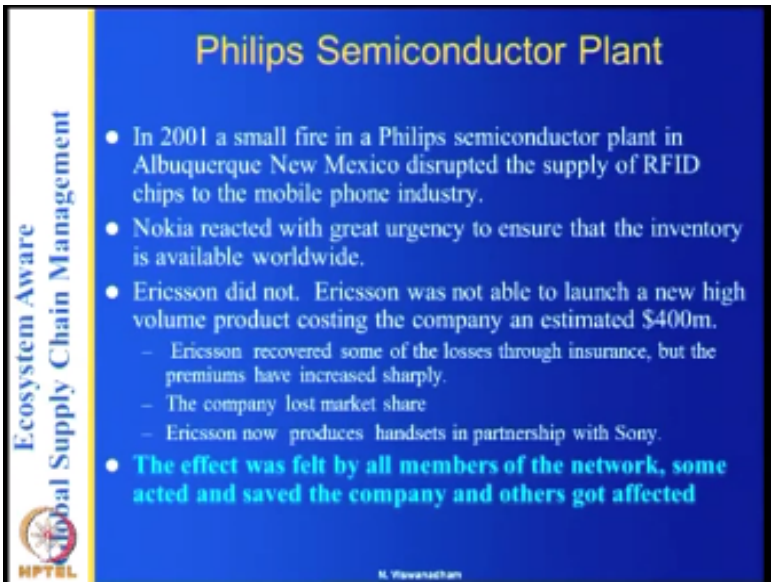

This one and this another one is that in 2011 I am giving you these examples to basically illustrate how countries can handle their risk in 2001 a small fire and Phillips semiconductor plant in Albuquerque new Mexico.

In the US has disrupted the supply of RFID chips to mobile phone company so this where they supply this RFID chips and then the two companies were supplying Nokia reacted with great urgency to ensure that inventory is available worldwide so Nokia what they have done the duplicate or second sourcing and they got these plants and this whereas son Ericsson did not Erickson was not able to launch a new high volume product costing an estimated loss of 400 million so there are two companies Nokia and erection Nokia reacted with great urgency that and so that inventory is available worldwide by sourcing from other sources these are any chips and whereas Ericsson did not Ericsson required some of the losses through insurance.

But the premiums have increased sharply so basically all these companies are insured so you want to transfer the risk from yourself to the insurance companies but what happens is the risk the risk is that you will basically pay higher improve higher premiums in the future years and the company lost the market share because it is not able to supply and Erickson now produces handsets in partnership Sony Ericsson has lost the business and it has to basically collaborate with Sony to do this the effect was felt by all members of the network in other words in this particular case with Nokia and Ericsson, Ericsson did not respond properly.

There is no cure did and some acted and saved the company others got affected so it sometimes happens that Ericsson has to close its own deals its own company and it has to start a new company in partnership with Sony to do this so this they shows you that then you have to be very vigilant and how to act when a disaster strikes there is another aspect.

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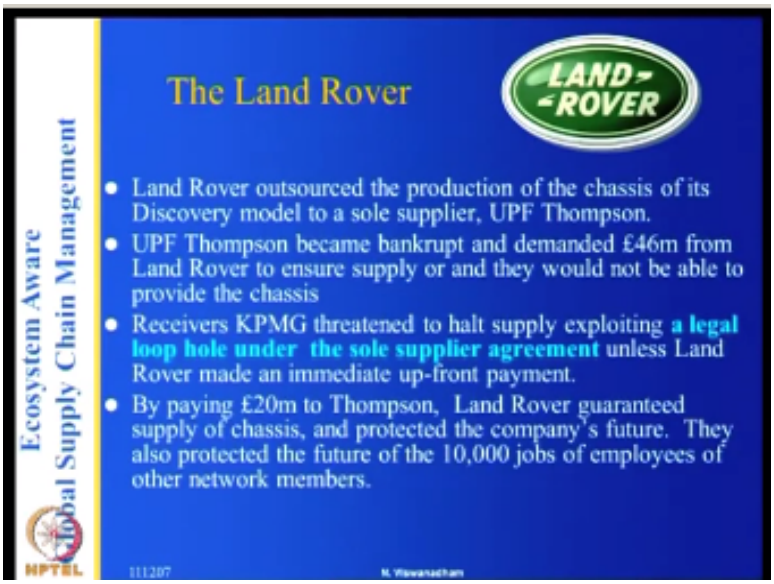

There is a land Rover is a you say is a company which sells land rover is a car it also says the production of chassis of its discovery model to a sole supplier UPF thousand now then there are two things when you when you are a manufacturer.

And when you are outsourcing a production you can tell the fellow that he is a sole supplier that means you are not going to source that product from anybody else well you are going to run the risk of when the sole supplier fails due to some reason then he cannot supply then let us see what happened here in this particular case ups Thompson became bankrupt and demanded 46 million dollars from land rover 2 into supply or they would not be able to provide the chassis so here is the issue that UPS dancing who is the sole supplier the energy agreement shows that if the sole supplier has for some reason can is not able to produce then the land rover need to provide the money and make it produce.

So that is what the deal is that is what the contract says so ups the unseen it says that it demanded 46 million dollars from land rover to ensure the supply they would not be provided choices and they can they are giving the option you can sources from somewhere else but if you want us to do it and because we have the capabilities to do it but we have become grant bankrupt so we have people we have the talent we have the equipment but we need money if you give four to six million dollars.

Then we can supply then KPMG but the receiver that certain to haul supply X exploiting a legal loophole under the sole supplier agreement unless land rover were made an immediate upfront payment so land rover has an option it bears this money and gets the chassis are it can say you can go elsewhere .I will go I will go to some other supplier but if it goes to some other supplier there will be lot of delay that is because it has to give the designs to the find another supplier give the designs train them and then get all this done so but that takes time so because of the sacrament what land rover did it has paid 20 million dollars.

To Thompson it has guaranteed supply of charge and protected the company's future so this also protected the future of 10,000 jobs of employees of other network members so you can see how the small print contracts things in the contract and when companies fail how they affect the entire supply chain here soul and Robin is another example so if you are signing a contract be careful.

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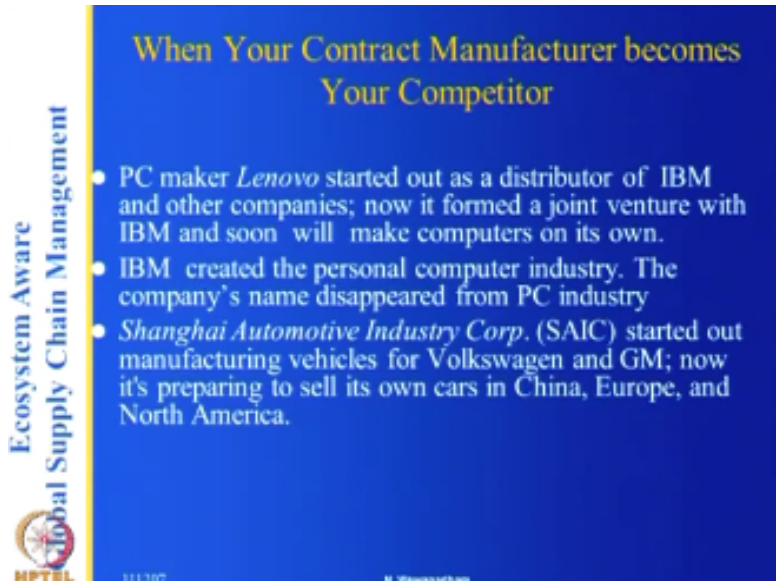

So when you contract manufacturer becomes your competitor well so in other words what happens is you are you are a manufacturer of William and you are giving your designs

everything to a contract manufacturer and you can happily sit at home and the contract manufacturer manufactures and probably delivers it to the distributors and retailers and so since you have basically had the designs so you are the Warner of the entire thing and it is your brand so you can make money but what happens if the contract manufacturer tries to cheat you or become smart so this happened with the PC Mona Lenovo started as a distributor for IBM and other companies now it formed a joint venture with IBM and soon it will make computers at its own now they are making computers PCS laptops.

And everything as its own but this is this is the kind of thing that that you can happen IBM created the personal computer in Street the company's name disappeared from PC industry IBM is still exists but it is as a services company but it could not keep the personal computer industry to itself that is because one of the prime reasons is outsourcing they with the windows and other things to other companies outsourcing the manufacturing to others so this is this unsay smartness did not exist to keep the this one and IBM got our load on the product side although it does do lot of strange survey.

There is anything auto company called shine guy automotive industry company industry corporation we started out manufacturing vehicles for Volkswagen and General Motors now it is preparing to sell it is own cars in China Europe and North America so I think what happens is the people are smart once you start doing things they learn they learned while doing things and they have lot of innovations they improve the processes. So use there and then they start their own company to manufacture cars and so on so that is what will happen in this so your contract manufacturer becomes your competitor that is a possibility certainly. So one has to be careful whew if you want to protect yourself from this kind of thing.

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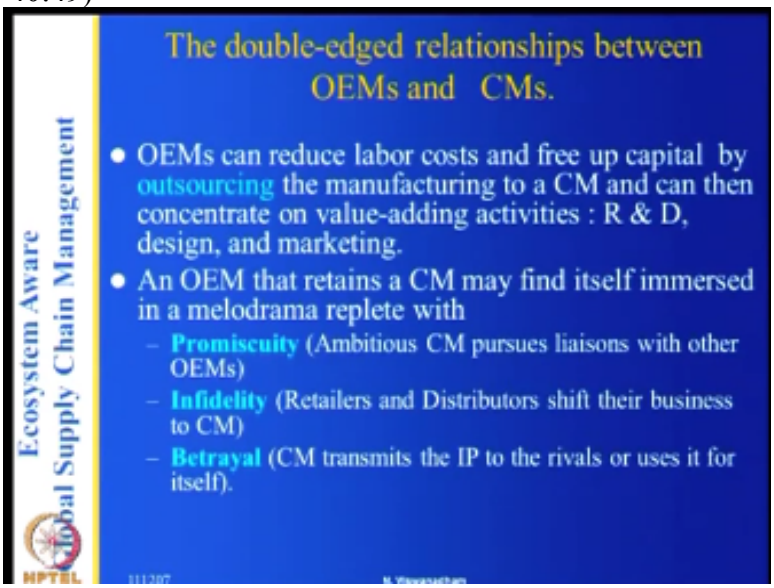

So the WT relationship between volumes and CMs so Williams can reduce labor costs why are you losing your outsourcing because you want to reduce the labor cost free up capital by outsourcing the manufacturing to the contract manufacturer and then concentrate on valuating activities like R&D design and marketing right so this manufacturing is a commodity activity so you want outsource it to people and you concentrate on out on design and marketing and I am selves so but then there are other people.

Who are smart and they are basically OM becomes CM find itself we must in a melodrama replete with promiscuity ambitious cm purse you slice on with other OMEs rather words is just label the same component same laptop same cell phone can be supplied to others and infidelity retailers and distributors shift their business to see him so the contract manufacturer instead of buying through no cure whatever within the brand volumes they can buy directly from the contract manufacturer with the same brand.

Which means they save whatever they are paying to the OM betrayal cm transmission IP to the rivals or roaches it uses it for itself so there are always a chances of the OM getting hollered out or getting cheated if they are not careful so we will also look at how to solve this particular problem.

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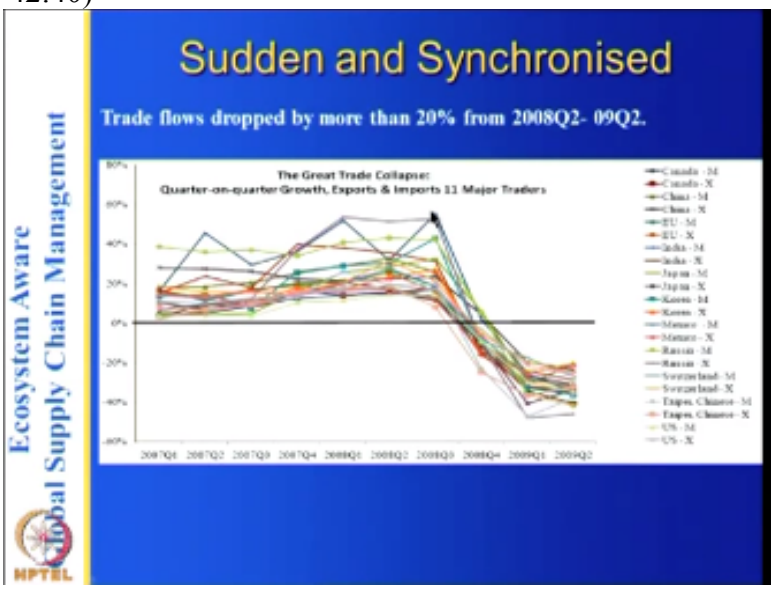

In this and so on so there is all so sudden and synchronized Rob who have seen in the trade falls by more than the trade flows drop by more than 20 % in the 2008-2009 quarters and as I told. You before that the drop is synchronized recognized in the sense it happened to all the countries not one country and it happened to all the countries for both important export so why did this happen this happened because of the loss of demand in the United States and Europe and that has been felt in the Asia-pacific region by the cancellation of the orders because there is inventory for 15-20 days that is kept and also inventory on the Seas inventory on the roads in

the trucks so people said all right let us see by the crisis ends then we can order again and then they cancel the orders so once they cancel.

The order there are no export or there is no import so that has caused the this particular shutdown but people blame the supply chain for this because the supply chain is connected and it is synchronized so this drop happens is also synchronized because any cancellation happens across the globe from one place to the other if you are if somebody is manufacturing some computer chips somewhere and the order is cancelled then it would not sell it to the some other place where it is put in at PCB and then PCB cannot be transmitted.

To the some other country where they are making pieces and so until this is this is an effect that that happens with this so the trade flows got affected and that is called and so on as a as a supply chain this one the synchronization was due to the connectivity of global supply chains that reacted just in time to the collapse the demand.

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And they are also act as the risk transmitters and amplifiers efficiency contributors of supply chain turned as these creators outsourcing well if you are outsourcing we have seen the risks or out rousing theft of IP do doe hollowing out your business and so on the internet and international logistics.

Well there is a government international logistics is always involves it is the government's it has various kinds of ships and deliveries and so on so this there any changes in the government policies regulations they will affect this one and internet credit through LCS that is the letter of credit trade and financial flow liberalization all these things or efficiency contributors and they

have turned as risk creators at 2008 financial crisis and decline in trade that is also called people who are saying it is d globalization people do not want this globalization because this globalization is creating havoc.

In their supply chains 2001-11 master element earthquake tsunami nuclear crisis and plant shutdowns in Japan threat and supplies to God watts across the globe so if you look at what is the effect of all this Japan earthquake and tsunami it coasted 210 million the island flats 30 billion new Zealand earthquake 20 billion United stash thought it was 15 million Australian flats seven billion so you can say that place of disaster estimated costs of natural disasters in two thousand land which will be the costliest year on record so in 2011 these are all the kinds of things so that companies have lost because of the natural disasters. So the supply chains act as face transmitters and amplifiers and then the big point is if the whole all your supplies suppliers as well as the manufacturers and the distributors everybody is either in India United States on China they are co-located in one country.

Then if a disaster strikes everybody goes if on the other hand the disaster doesn't strike that country and it strikes some other country you are not affected so the supply chain sacks as risk transmitters are amplifiers one economy is affected by the other because of the interconnectivity of the supply chain so the supply chains if you want to make them more efficient make them more connected with more supply chain visibility and so on then it so happens that you have you have basically more prone to more risk and so on.

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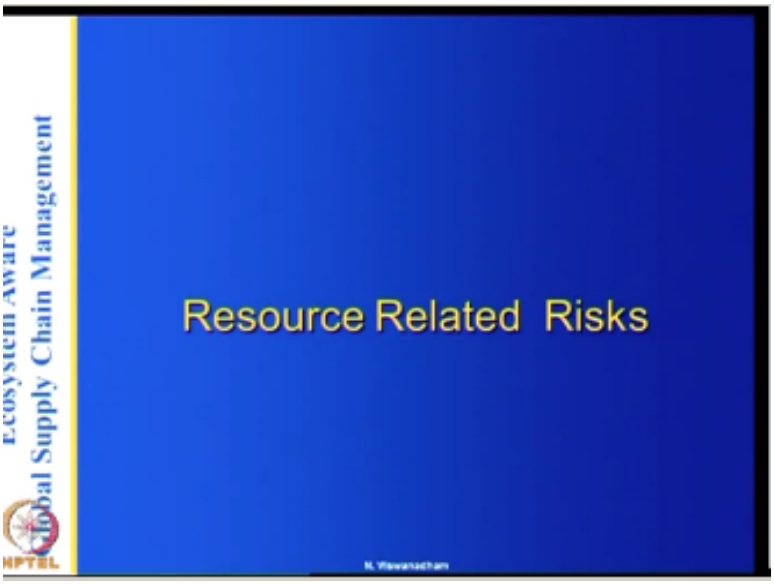

So if you look at this let us look at there is also late at the Rays the second one.

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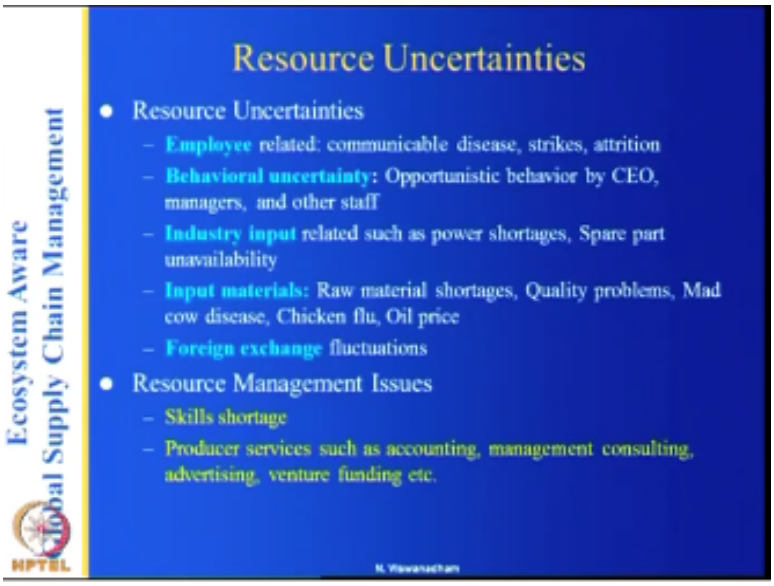

So in the resource uncertainties or basically employ related it can be communicable disease strikes and Natasha you know when the h1n1 struck China there was a there was a lot of problem .I think you know in most of these this one and the flues and others the number of working hours comes down drastically and the employee productivity comes down because of the disease we behavioral uncertainty opportunistic behavior by the CEO managers on other staff well if they if they want to cheat and then want to get down.

To this business then there is the opportunistic behavior an industry input related such as power shortages spare parts on availability and so on and input materials like raw material strategist quality problems mad cow disease chicken flu oil prices and others and foreign exchange fluctuations these are all the resource uncertainties that we affect the supply chain and resource management issues like skill shortage it produce a services like accounting management consulting advertising venture funding and all that with you if you do not have this then what happens is then the management issues get it skills shortage is one of the issues.

That is being faced by all countries and that needs to be managed very carefully because the manpower particularly the human power the managerial capabilities is important to her risk management because during risk it is these things cannot be automated anymore because things have failed either due to automation or automation like IT and other logistics facilities may have failed and such a case it is the only the human power that becomes the possibility one that is this one so energy commodity and transportation.

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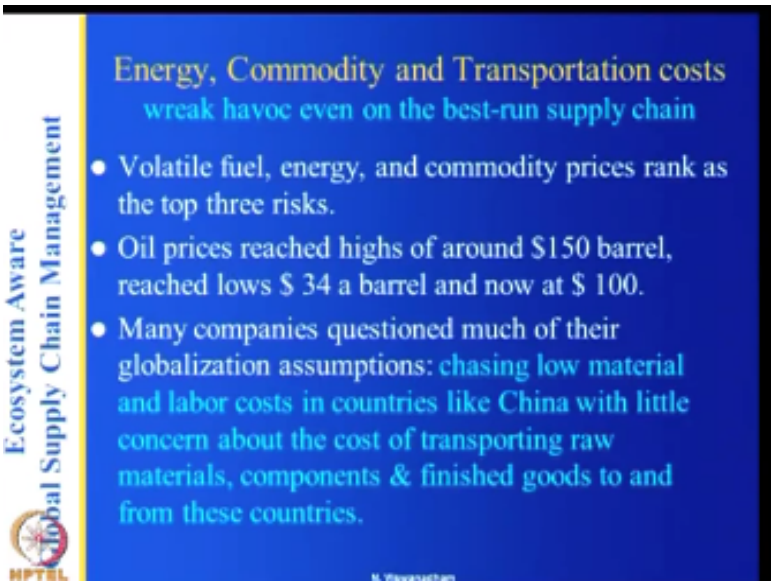

So wreak havoc even on the best run supply chains volatile fuel energy and commodity prices rank as the top three risks now you can see the oil price fluctuations every day and also the commodity prices from gold to copper to iron and so on so they become they are the basically natural resources based and they are basically their price fluctuations and also it is becoming expensive to mine and also it run transport these and everybody is looking for these resources so there is a lot of demand so all these things make the this commodity risk this one the oil prices have reached heights of 150 Baylor's Richard lows of 34 below the dollars a barrel and now it is at hundred.

In many companies questioned much of their globalization assumptions chasing low cost and labor costs in countries like China with little concerned about the cost of transporting raw materials components and finished goods to and from these countries, so as I said before yesterday in the performance this one I presented the transportation or the transaction costs the transaction costs are not just the unit cost is the cost of transportation is the cost of taxes and other things including those of the risk and management coordination costs.

During risk times and so on so this is it is it worth to chase low-cost material labor costs in countries like China or do you want to do things in your own countries so if you took a look at the transaction cost the total transaction costs or using the ecosystem framework then you will you will be doing a much more informed about a sourcing.

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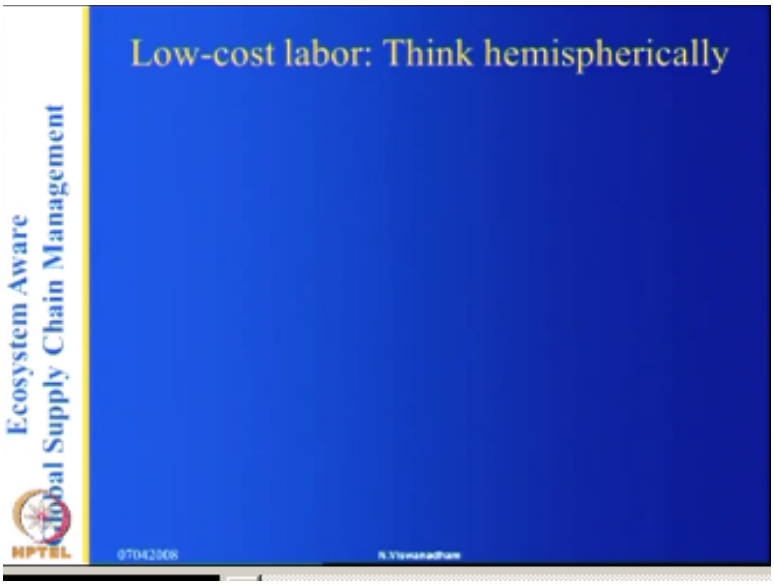

I said what I will stop here and then continue later in next lecture.

Programme Assistance

Guruprakash P

Dipali K Salokhe
Technical Supervision

B K A N Singh
Gururaj Kadloor

Indian Institute of Science
Bangalore