

Indian Institute of Science
Bangalore
NPTEL
National Programme on
Technology Enhanced learning

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Global Supply Chain Management

Lecture – 10

Supply Chain Risk – Part 2

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So we have been talking about the supply chain risks in the ecosystem element resources which are basically the natural human financial and industry clusters and so on. The energy commodity and transportation costs wreak havoc even in the efficient supply chains.

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**Energy, Commodity and Transportation costs
wreak havoc even on the best-run supply chain**

- Volatile fuel, energy, and commodity prices rank as the top three risks.
- Oil prices reached highs of around \$150 barrel, reached lows \$ 34 a barrel and now at \$ 100.
- Many companies questioned much of their globalization assumptions: chasing low material and labor costs in countries like China with little concern about the cost of transporting raw materials, components & finished goods to and from these countries.

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Volatile fuel, energy, and commodity prices rank as the top three risks. Oil prices reached highs of around \$150 barrel, reached lows \$ 34 a barrel and now at \$ 100. Many companies question much of their globalization assumptions: chasing low material and labor costs in countries like China with little concern about the cost of transporting raw materials, components & finished goods to and from these countries. The Transportation or 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.

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Low-cost labor: Think hemispherically

- LCCs are viewed as best places to acquire goods & services
- Companies assumed permanence of inexpensive labor and underemphasized the impact of other costs : raw materials, transportation, and energy & made long-term contracts.
 - Iron ore contracts between Brazil, India and China
- Brazil ships across the Pacific, 17% of the iron ore that China uses to make products for Americas
 - When you add up the incremental transport, energy, and inventory expenses for such trans-shipment, China's labor cost advantage over places like Brazil or Mexico largely disappears.
 - A whole lot of product is moving an extra 10,000 miles without realizing significant savings.

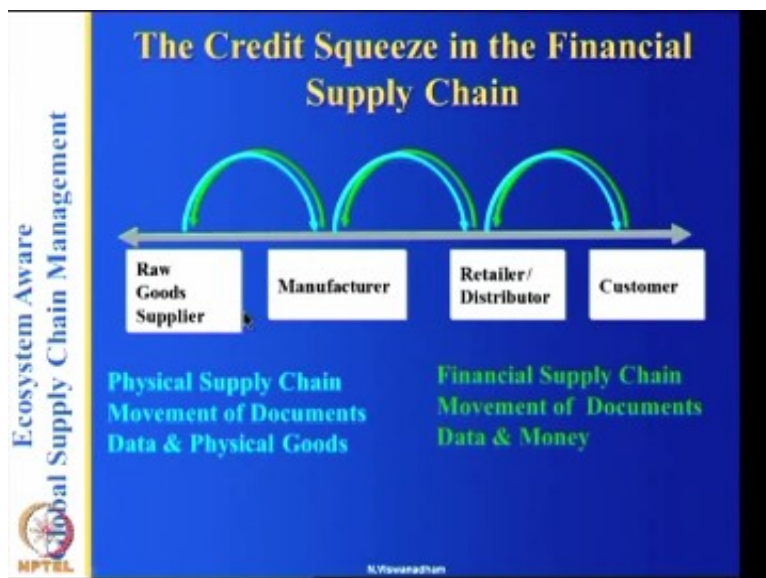
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Low-cost labor: Think hemispherically

LCCs are viewed as best places to acquire goods & services

Companies assumed permanence of inexpensive labor and underemphasized the impact of other costs : raw materials, transportation, and energy & made long-term contracts. Such as Iron ore contracts between Brazil, India and China

Brazil which is a South American country it ships iron to China and China makes products and send it back to America. If Brazil and ships directly to America then it will be lot cheaper your whole lot of product is moving in extra 10,000 miles.



In the financial supply chain, the goods move in the forward direction where the finances move in the reverse direction. Suppose there is credit squeeze, the customer goes to a bank for credit, he doesn't get the credit which means he cannot buy. Once he cannot buy, the retailer has no business and he cancels the order from the distributor, distributor cancels from the manufacturer and manufacturer cancels the raw goods suppliers. Both the financial and physical supply chains are interrelated.



I had this now this shows the bird flu outbreaks in the world.. The red ones are the ones where there is bird flue with outbreaks and also countries with outbreaks including human cases. The whole of Asia Pacific got affected the birds and it gets to the human. So basically they have to destroy the birds and I will just create a lot of problems in terms of the meat supply. So we have a supply chain risk a second one is the resource risk.



Let us look at what are the risks were the institutions. This economic and political related uncertainties



Economic and political uncertainties affect all businesses across all industries. The **Economic** factors such as economic slow down, country policies and ratings, foreign exchange fluctuations , interest rates and also the political country-to-country relationship changes in the

governments will create risks for supply chains. **Government policy changes:** Price controls, Free trade zones, Inadequate public services, Nationalization, barriers to earning repatriation are major factors to the supply chains. **Security** related issues like Terrorist attacks can slow the demand and thus affect the supply chain

Protectionist behavior of Countries hiking the duties against the trade agreements to protect local companies against the competing global imports. Textile Quotas abolition by USA and EU in January 2005 is an example of the protectionist behavior. Shipments from China were waiting at the US and EU ports because I had no quota restriction when they were shipped . Both US and USA wanted to voluntarily restrictions. Similar is the story of Auto components Malaysia AFTA. According to AFTA (Asia-pacific trade agreements) auto components can be freely exported across all these countries. Malaysia said because it's country company is getting affected they refuse import of auto companies. Anti-dumping is another protectionist behavior because the import affects the local companies. And cannot be permitted .

Rules and regulations particularly in taxes and tariffs, foreign exchange regulations, inspection site visits, delayed payments, local company preferences for the government contracts acts as protectionist behavior.

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Government Regulatory Risk

- The most pervasive and subtle forms of discrimination against the MNCs is **regulatory discrimination**
 - Anti dumping
 - Changes in rules and regulations particularly in taxes and tariffs
 - Foreign exchange regulations
 - Corruption: Inspections, site visits, delayed payments
 - Local company preference for indirect materials for Govt. contracts
- These measures are sometimes intended to shield uncompetitive locals and also to protect natural resources
- Walmart could not enter Indian retail market and MCC was vandalized

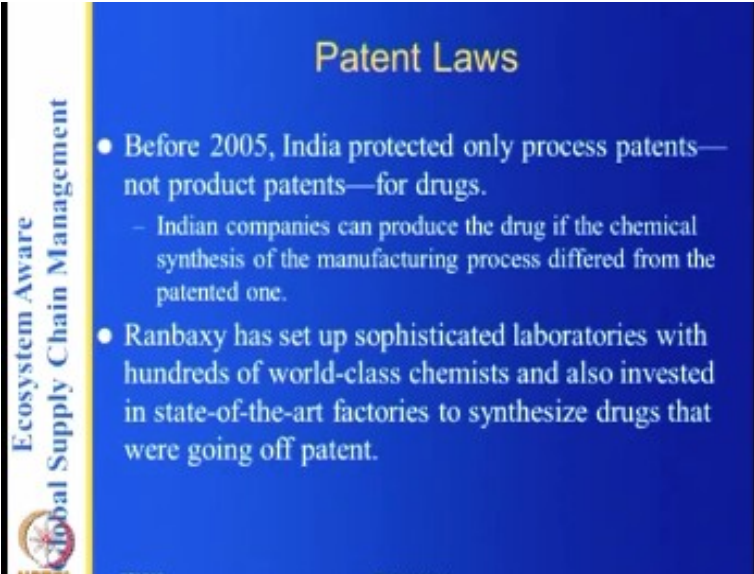
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The most pervasive and subtle forms of discrimination against the MNCs is regulatory discrimination

Anti dumping ; Changes in rules and regulations particularly in taxes and tariffs; Foreign exchange regulations; Corruption: Inspections, site visits, delayed payments; Local company

preference for indirect materials for Govt. contracts etc. These measures are sometimes intended to shield uncompetitive locals and also to protect natural resources

Walmart could not enter Indian retail market and MCC was vandalized



Patent Laws

- Before 2005, India protected only process patents—not product patents—for drugs.
 - Indian companies can produce the drug if the chemical synthesis of the manufacturing process differed from the patented one.
- Ranbaxy has set up sophisticated laboratories with hundreds of world-class chemists and also invested in state-of-the-art factories to synthesize drugs that were going off patent.

Before 2005 India protected only product process patents not product patents for pharmaceutical drugs. There is a difference between product patented process is the process by which you manufacture a particular drug even if the the product is patented. Any company can produce the drug if the chemical synthesis or the manufacturing process differed from the patented. They can synthesize new drugs by combining two or three drugs whose patents are expiring . One can take a patented drug and reinvent the manufacturing process and manufacture the same drug and market it as your own. Ranbaxy has set up sophisticated laboratories with hundreds of world-class chemists and also invested in state of art factory infrastructure to synthesize drugs that were going off the patent .



China is the top contributing region for 9 of the 15 risks, including intellectual property infringement, supplier and internal product quality failure, and security breaches. This creates a dilemma for many global companies

Regions that contribute the most to each Supply Chain Risk: US and China for different risks; China for quality and supply failures

	U.S.	Canada	LA	China	India	Other AP	MEA	EJC Europe	W. Europe	Not a risk in any region
Regulatory compliance	22%	1%	5%	34%	3%	6%	5%	2%	6%	10%
Supplier product quality failures	4%	0%	6%	55%	3%	6%	6%	4%	1%	12%
Supply failure	11%	0%	6%	27%	11%	11%	14%	3%	3%	13%
Internal product quality failures	6%	2%	7%	47%	7%	5%	8%	4%	2%	13%
IP infringement	4%	2%	2%	59%	0%	4%	4%	3%	1%	16%
Immature physical infr.	3%	1%	10%	18%	15%	15%	17%	3%	1%	17%
Volatile labor cost	20%	4%	9%	20%	0%	4%	4%	5%	6%	20%
Lower consumer spend	47%	2%	7%	5%	5%	2%	6%	5%	2%	20%
Volatile transp. costs	14%	1%	5%	20%	7%	11%	11%	4%	7%	20%
Volatile energy costs	31%	2%	7%	11%	4%	5%	8%	8%	5%	20%
Commodity price volatility	22%	3%	9%	17%	5%	8%	6%	4%	6%	21%
Shortage in mgmt talent	7%	2%	10%	20%	4%	12%	14%	5%	1%	26%
SC security breaches	4%	2%	6%	32%	6%	8%	11%	4%	0%	26%
Natural disasters	12%	1%	5%	21%	5%	22%	3%	2%	0%	30%
	9%	1%	2%	26%	11%	6%	6%	5%	0%	32%

AMR Research

Supplier product quality failures, supply chain security breaches, raising labor costs, regulatory compliance, supply failure, rise in transportation costs, IT risk, commodity price volatility, shortage of managerial talent, natural disasters, inefficient physical infrastructure, rising energy costs, lower consumer spending are all the risks the supply chain faces.

US has regulatory compliance issues of 22 percent and China has 34 percent whereas India has only 8 percent and supplier product quality failures are high in China and low in India and similarly volatile energy costs the 31 percent very high in the US and it is less both in India and China. You can map all these into the ecosystem framework and find out which one is important in this.

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Sustainable Development for a Business Enterprise

- Sustainable development means adopting business strategies and activities that meet the needs of the enterprise and its stakeholders today while protecting, sustaining and enhancing the human and natural resources of the future.

Strategic Focus and Trade-offs of Sustainable Management

The diagram consists of three overlapping circles:

- Economic Development (Shareholder Return)** at the top.
- Environmental Protection (Environmental Impact of Business Activities)** at the bottom left.
- Social Well-being (Employee Impact on Society)** at the bottom right.

 The central intersection of all three circles is labeled **Business Result Focus Area**. Arrows point from the outer regions towards this center, with the label **Responsible Focus (Trade-offs)** indicating the balance between these domains. A **Strategic Focus** arrow points to the left side of the diagram.

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Sustainable development means adopting business strategies and activities that meet the needs of the enterprise and its stakeholders today while protecting, sustaining and enhancing the human and natural resources of the future.

The GHG gases, the carbon footprint represent sustainability. There are three things that that are important: the economic development, the social well-being and the environmental protection. Governments are concerned about the economic development so they want to create industries that create jobs for people and also the social well-being. But economic development can create environmental disasters so you have to basically this is a triple bottom line that people talk about you have to trade between the economic development, environmental protection and social well being. People are trying to try to balance out between the economic development as well as the environment disaster and social well-being

Sustainable development is adopting business strategies and activities that meet the needs of the enterprise and stakeholders of today while protecting sustaining and enhancing the human and natural resources of the future .

Community risk In India

- Tata Singur
- Nandigram
- Vedanta mining –Orissa
- Posco in Orissa
- Goa SEZ
- MCC Bangalore
- Reliance fresh banned in several states

111207 H. Viswanathan

Risk happens and business have to be careful when it is affecting a small players and also it is affecting the land has that needs to be procured from farmers. So one has to be extremely careful of the community risk. In India there are several companies got affected because of the community risk and social groups?

Tata Singur is in West Bengal. Nano which is the an innovation in itself it is a Rs1 lakh car that is \$2,500. The locals and the SMEs created a lot of problems and Tatas have to finally move out and establish the factory in some other state. They lost lot of money because they have built the factories and their suppliers and partners also established their factories.

Vedanta mining in Orissa was going Orissa and a gram oh I see Jets and MCC in Bangalore reliance flash banned in several states and so on so basically the reliance fresh is a it is a retailer selling fresh groceries but it is banned because it is going again as the hawkers it is going again as the Karana shops small players who are basically selling these things in the streets so for several teary similar to these several reasons the community.

MCC is a the Metro cash-and-carry which is a wholesaler ;they have established a presence in Bangalore India but there were vandalized because they affect the retail shops. Reliance fresh banned in several states

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Location Decision: Conflict with Farmers

- Tata Motors a case point:
- Land acquisitions for projects of about 92,000 acres(\$54 B) were stalled by protests launched mainly by peasant farmers

Location Decision: Conflict with Farmers

Tata Motors a case point: Land acquisitions for projects of about 92,000 acres(\$54 B) were stalled by protests launched mainly by peasant farmers

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Infrastructure Projects: Time & Cost Overruns

- Delays and cost overruns have significant implications: people have to wait for the provision of public goods and services longer, limits the growth potential and reduce the competitiveness of the economy.
- Delays in land acquisition, shifting of utilities, environmental and inter-ministerial clearances, shortage of funds and contractual disputes are the major causes behind time and cost overruns in India.
- Governments go for PPP but even those are equally vulnerable to the contractual and organizational failures. Projects for the up gradation of the Delhi and Mumbai airports, construction of the Bangalore Metro and the Delhi-Gurgaon Expressway PPP experiencing major time and cost overruns.
- Execution of infrastructure projects is not well managed

H. Vinayachandran

Delays and cost overruns have significant implications: people have to wait for the provision of public goods and services longer, limits the growth potential and reduce the competitiveness of the economy. Delays in land acquisition, shifting of utilities,

environmental and inter-ministerial clearances, shortage of funds and contractual disputes are the major causes behind time and cost overruns in India. Although the government is a partner but still projects with top gradation of Delhi and Mumbai airports construction of Bangalore Metro and Delhi Gurgaon Express me PPP is experiencing major time and cost overruns

Governments go for PPP but even those are equally vulnerable to the contractual and organizational failures. Projects for the up gradation of the Delhi and Mumbai airports, construction of the Bangalore Metro and the Delhi-Gurgaon Expressway PPP experiencing major time and cost overruns.

Overall, the Execution of infrastructure projects is not well managed resulting in delays and sometimes issues of quality. The governments change can result in thought leadership changes affecting the contracts. When you are designing as an infrastructure project, the governments should have proper project management by coalition of all the resources including the land and taking agreement of all the people who are selling the land and so on, but if you start the business

So also there is the issue of terrorism.

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The Changed Nature of War

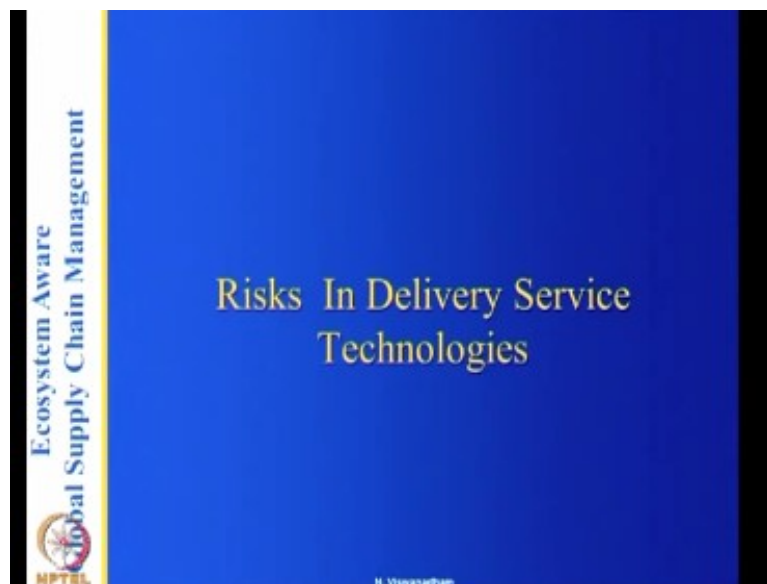
- In the 20th century the world was confronted by adversaries who were stationary, observable, and conventional. The enemies' weapons of choice were tanks, planes, bombs, ships, and so on; and an individual soldier was not a significant threat to any nation's security.
- The adversary today is agile, unconventional, and stealthy. His weapons are Microsoft, suicide vests, machetes, AK47s, and roadside bombs
- Modern transportation and changes in demographics have further provided potential enemies a global reach.
- These have created the so-called "super-powered individual" that have the ideological motivation and also the material means to inflict significant harm to any nation.

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AK47s, and roadside bombs Modern transportation and changes in demographics have further provided potential enemies a global reach. These have created the so-called "super-powered individual" that have the ideological motivation and also the material means to inflict significant harm to any nation.

If you have a container in a ship and if somebody puts a bomb in the ship so it explodes when it reaches the destination port, then how do you find and counter that particular attack. It is not possible even if you have a big army, tanks, planes and declare a war. It is basically very unconventional and it is a single human being who is planting a bomb and these kind of attacks are happening nowadays. Modern transportation improvements and changes in demographics have further provided potential enemies in global reach. These created so-called super-powered individual that have ideological motivation and also the material means to inflict significant harm to any nation. Transport security involves checking your containers as well as ship equipment

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So what are the risks and a delivery service?

Risks In Delivery Service Technologies

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- Delay or unavailability of either inbound and outbound transportation to move goods due to carrier breakdown or weather problems
- Failure of information and communication infrastructure due to line, computer hardware or software failures or virus attacks, leading to the inability to coordinate operations and execute transactions

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Risks In Delivery Service Technologies involve Delay or unavailability of either inbound and outbound transportation to move goods due to carrier breakdown or weather problems . Failure of information and communication infrastructure due to line, computer hardware or software failures or virus attacks, leading to the inability to coordinate operations and execute transactions. You can see in the slide that while transporting the whole thing fell into the sea and it takes time to rescue this container.

Cyber Security: Biggest Risk of Connectivity

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- Computer systems are subjected to electronic attacks originating from sources that are usually unidentified.
- The terrorist and counterfeit networks are also globally connected and indeed they follow the HR practices of recruitment, training of people and also systematic planning processes for implementing their objectives

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Cyber Security: Biggest Risk of Connectivity. Computer systems are subjected to electronic attacks originating from sources that are usually unidentified.. The terrorist and counterfeit

networks are also globally connected and indeed they follow the HR practices of recruitment, training of people and also systematic planning processes for implementing their objectives. If your container has an RFID tag to track it, not only you can track it even the terrorists can track it. In recent times that the hackers are able to get into the control systems or control towers as they are called the and they were able to bring down the computer systems

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Somali Pirate Operations

- Pirates have expanded over the years 2006-10
- Many of the world's most powerful navies are involved: US, EU, India, Malaysia, Indonesia and South Africa.
- The Japanese and South Koreans send warships to protect ships carrying cars.
- It is still cheaper & convenient to pay higher insurance fees and take risk being attacked by pirates than to incur the extra cost of diverting vessels around the Cape of Good Hope.

251107 N.Viswanathan

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High Consequence- Low Probability Disruptions

MPTEL Ref. Adapted from Dr. Delma Elkins, General Motors

Supply chains are designed to deliver the maximum intended value by mitigating high probability operational risks. In the event of a low probability high impact systemic failure, a supply chain not only fails to deliver its intended value but may also result in losses. If you are distributed all over the globe anything that affects any part of the globe, Whether it is a thunderstorm, whether it is a terrorist attack, whether it is a truck failure, it affects your supply chain. So high consequence low probability disruptions happen all over the globe and in your supply chain becomes highly vulnerable because of them.

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Risk Propagation and Amplification

- In a globalized world the risk for the supply chain could come from three other very important factors which are often ignored.
 - Connectedness on a global scale
 - Large scale concentration for competitive efficiency
 - Lack of governance structures for fast response

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In a globalized world, the risk for the supply chain could come from three very important factors which are often ignored. They are connectedness on a global scale, large scale concentration of competitive efficiency and lack of governance structures. But they are very vulnerable because any attack big or small can affect the cluster and bring down the entire supply chain

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GSNs as Risk Transmission & Amplification Channels

Credit crunch affects trade finance and hence trade volumes.

- Prices for letters of credit increased in 2008 and 2009 & trade-related loans were charged higher interest rates
- Preference to source from domestic suppliers during downturns because of **trust or financing problems & greater protectionist policies**

Global supply chains that reacted “just in time” to the collapse in demand resulting in synchronized fall in trade volumes from all countries.

- A sharper decline of firms’ inventories
- Greater protectionist policies
- A larger decline in trade of goods, which make up 70% of world trade

N.V. Viswanadham

GSNs or global supply chains are risk transmission and amplifier channels. We already saw that credit crunch that affected trade finance, prices for letter of credit have increased from 2008 and 2009, preference to source from domestic suppliers during short downturn because of trust of financial problems, and the synchronous collapse of trade collapse in the one.

Credit crunch affects trade finance and hence trade volumes. Prices for letters of credit increased in 2008 and 2009 and trade-related loans were charged higher interest rates. Preference to source from domestic suppliers during downturns because of **trust or financing problems & greater protectionist policies**.

Global supply chains that reacted “just in time” to the collapse in demand resulting in synchronized fall in trade volumes from all countries with A sharper decline of firms’ inventories, Greater protectionist policies and A larger decline in trade of goods, which make up 70% of world trade

Systems of Systems and Systemic Risks

- Network industries of critical infrastructures – electricity, transport or communications- have the features of connectedness, large size, and loose governance structures. These *systems of systems* are subject to *systemic* risks.
- Connectedness makes individuals and organizations accessible over distance.
 - **On the positive side**, victims of disasters are easier to reach, and emergency rescues can be organized more efficiently using Satellites and Wireless based monitoring and warning systems .
 - **On the negative side**, connectedness multiplies the channels through which accidents, diseases or malevolent actions can propagate. Natural disasters at one side of the planet can have substantial economic and financial impacts at the other. Epidemics spread more rapidly due to the international travel and trade and tourism

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Clustering & Concentration

- Global pressures in some industries encouraged the search for efficiency through larger scale and a high degree of concentration as in for *e.g.* super-aero planes and gigantic dam projects, Giant firms such as DHL, Flextronics etc. mergers and acquisitions, and geographical concentration (*e.g. low cost manufacturing in China, IT clusters in India, Auto or pharma Industrial clusters*).

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Global pressures in some industries encouraged the search for efficiency through larger scale and a high degree of concentration as in for *e.g.* super-aero planes and gigantic dam projects, Giant firms such as DHL, Flextronics etc. mergers and acquisitions, and geographical concentration (*e.g. low cost manufacturing in China, IT clusters in India, Auto or pharma Industrial clusters*). Damage due to an accident is higher for a concentration rather than for separate owners in several locations (bird flu effect on China in early years of this decade).

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Many Actors and Risk Governance

- Risk management need to be radically modified with the changing role of governments in the economy and dismantling of state-owned monopolies.
- Public issues related to risks nowadays involve a variety of actors, including corporations, representatives of civil society, non-governmental organizations, and experts
- Risk situations might be met with excessive inertia or inappropriate institutional responses, as in 26/11 terrorist attack in Bombay.

N. Viswanathan

Risk management needs to be radically defined with changing role of governments in the economy and dismantling of state-owned monopolies. Earlier times all the information technology companies, telecommunications and the transport companies were all under the

government. They are getting privatized and what happens to the risk management in this public relation issues related to this nowadays involve variety of actors such as corporations, representatives of civil society, non-government organizations and experts. Risk situations might be met with excessive inertia and inappropriate institutional response as in 2011 more attack in Bombay on 26 November 26.

And the issue then will be what how do you create a risk resilient supply chain.



Let us summarize what we are talking in terms of the risk. we have taken the four elements of the ecosystem the supply chain, the resources , the institutions and the delivery mechanisms. We talked about all the kinds of risks that happen .If you want to have risk mitigation strategies and have a governance structure to create a resilient supply chain it is going to be highly expensive and it is almost impossible this is like finding a human being who will not will not die.

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