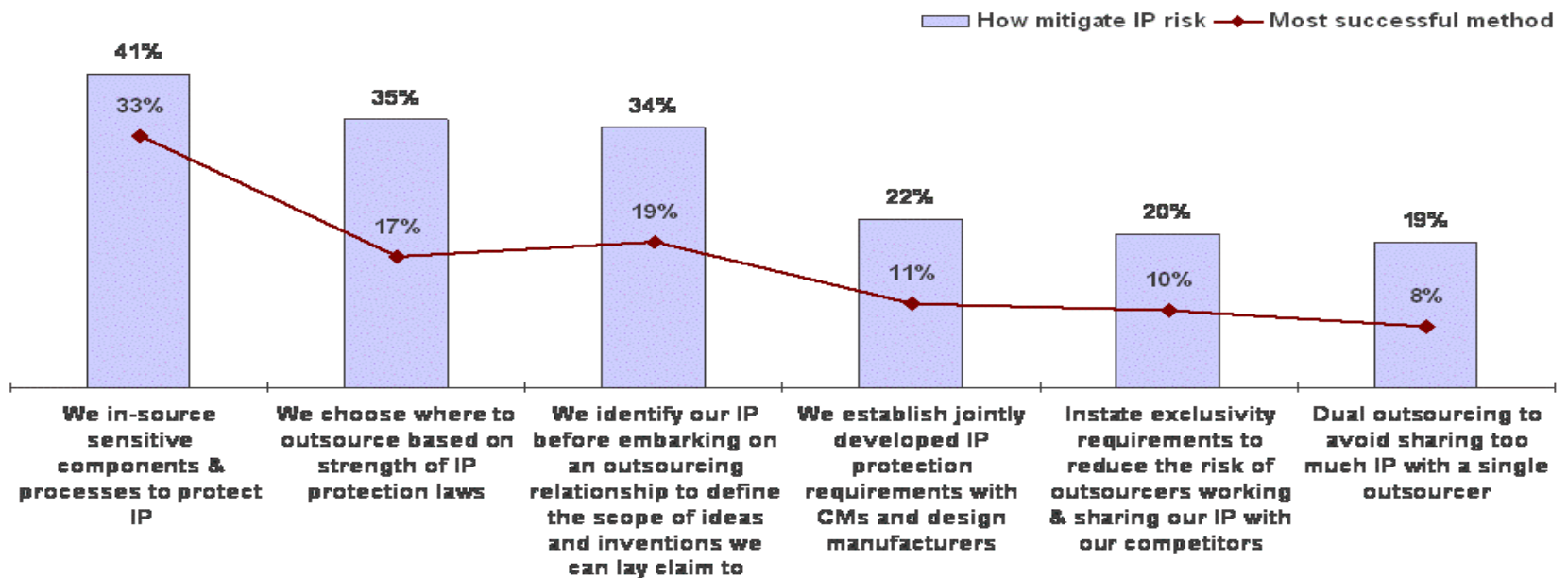


Step 5: Identify Feasible Supply Chain Configurations for Implementation

Step 5: Feasible Supply Chain Configurations for Implementation

- For the product of your company (knowledge, product, solutions, value chains) Identify the partners (Companies & Countries) for the Goods, Information and Financial flows and also the risks of partnering
 - Use the ecosystem information of partners of your partners while assessing the risks (Failure of a Govt., Bank or an Earth quake)
- Map the supply chain processes including methods of collaboration and also for ensuring partner loyalty
- Map your supply chain for each customer order and have mitigation strategies for operational possible attacks, failures, etc.

Mitigating IP Risk: The most common and most successful method is to in-source sensitive components and processes



n=133

How do you mitigate the IP risk?

What is the single most successful mitigation risk method?

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Enablers and Supply Chain Performance

	Product & Value Chain	Logistics & IT	Trade Policies	Resource Management
Enablers	Modular Products, JIT, TQM, SRM, SC Visibility, Collaboration	Connectivity, Port, Road & IT Infra., 3PLs, Software Vendors	FTAs, Customs, Forex Stability, Patent & Legal System, Trade Facilitation	Power and Natural Resources, Manpower Capability, Management Skills
Lead Time	Low	Low	Low	Low
Cost	High Product Design Cost, Low Production Cost	Low Transportation & Inventory Costs	Low Tariffs, High Profits	Low Factor Costs
Quality	High Quality Products	High SC Service Levels & Market Reach	High SC Service Levels	High Management Quality
Flexibility	Product Configuration and cost	Delivery Service To global customers	Supply and Market Globally	Multinational sourcing and management

What do we have at the end of the Supply chain formation phase?

- Ecosystem map, various network partners (including manufacturing, logistics & IT) & their (country & regional) locations
- Risks that the ecosystem faces
- The innovations (product, process, business model) needed to make it big in the industry
- The value chain architecture with outsourced and ownership details.

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Project Planning and Management

Project Planning

- Any Green Field project has.
 - Project management involves project definition, construction and management of the facilities, attracting partners or suppliers, coordinating service providers, goods and information delivery, etc.
- Project management is a very well studied subject and execution software is available through SAP, Oracle etc. CPM and PERT are frequently used.

Possible Cost and Time Overruns

- Industrialization and land conversion creates tensions between the govt., industry and the farmers.
 - Construction of facilities requires several approvals and may require dealing with several government departments. This may result in time and cost overruns.
- IT and logistics infrastructure could be weak and end to end delivery service providers may not be available
- In case of electronic and apparel manufacturing project planning involves partner selection i.e. contract manufacturers from a global list and developing connections.
- In case of auto or electronic contract manufacturing, there could be land acquisition requirement and Government permissions then this step of project planning should be treaded carefully.

Building Governance mechanisms or Frameworks for Partner Selection , Coordination & Control

Governance: Partner Selection, Coordination & Control

- A separate chain is formed for each order
- **Partner selection** (Optimization, Social Network Analysis)
 - Structural features (asset specificity, capabilities)
 - Relational ties (Governments, Social organizations, cluster managements, Educational Institutions, etc.)
- **Coordination** : Determining who does what and when and communicating to everyone involves supply chain planning and visibility
- **Execution: Control Tower** to Monitor order status so that processes work as per plan & control exceptional events

Partner Selection

Partner Selection

- We identify suppliers for various Components and Services from all over the globe
- We short list them based on the criteria mentioned such as Location, Country policies, Delivery costs, Asset Specificity, Risk proneness, Innovation capabilities, Technology sophistication of hard and soft infrastructure, etc.
- Optimization, TCE, Social Networks, are used in the pre-selection process

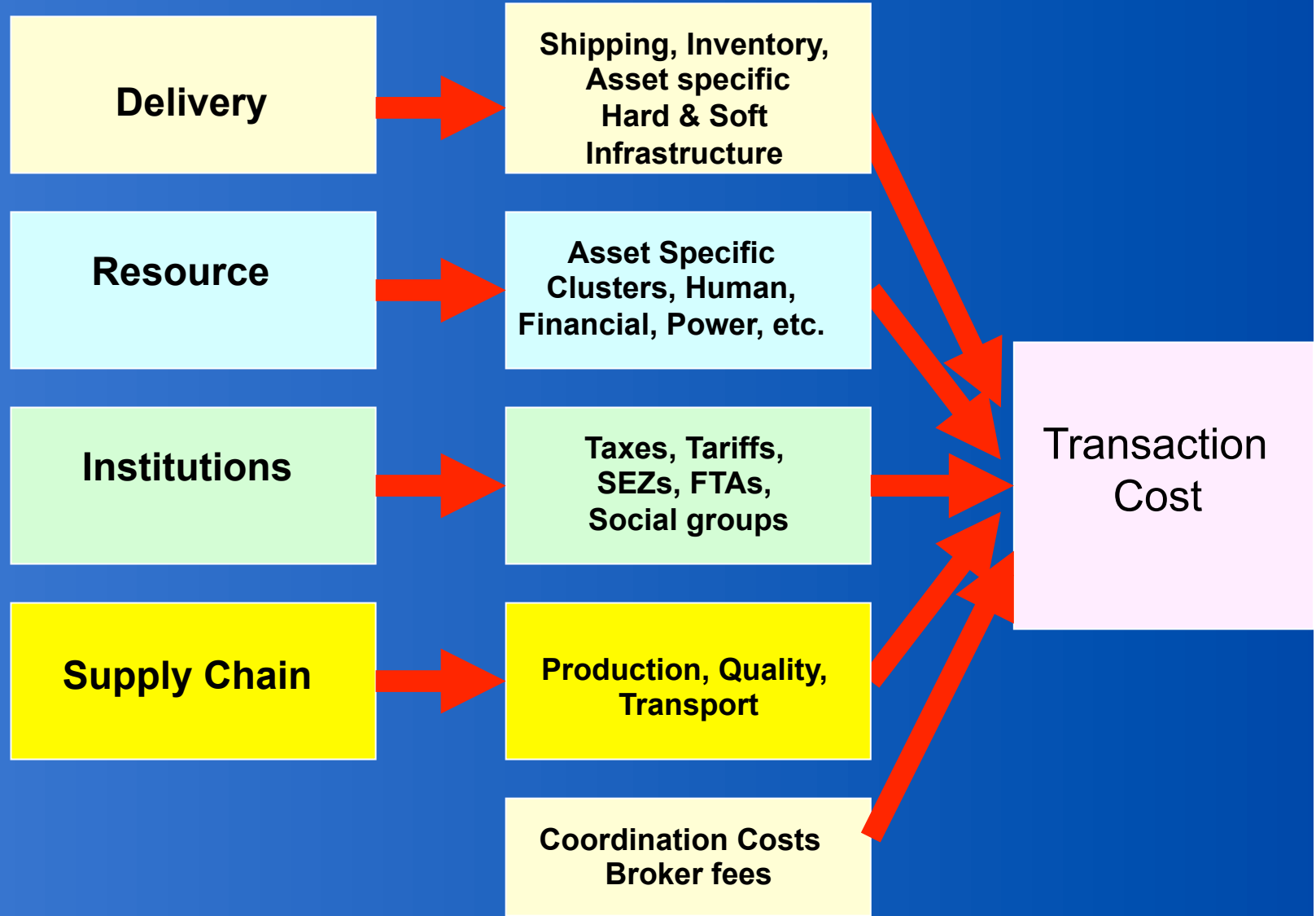
Mathematical Models for Partner Selection

- The **partner selection problem** can be formulated as Fuzzy AHP or MIP problem. One can rank order the suppliers for each component based on the ecosystem parameters based **on TCE**.

TCE and Partner Selection

- Transaction costs are the costs incurred to coordinate and connect all links in the global supply chain.
- Transaction costs relate to finding a suitable trading partner, negotiating, setting up the contract and monitoring compliance with the selected partner.
- Transaction costs include
 - **Observable costs:** transport costs, import duties, customs tariffs and other formal trade barriers
 - **Soft costs :** Costs for information gathering, negotiation & monitoring contracts, trust building, networking, risk handling and mitigation, making up for cultural differences and miscommunication, compliance with safety regulations , labor laws etc.
- The hard observable costs decrease with trade liberalization and decreasing transport costs , the soft costs of social connections gain relative importance

Transaction Costs



Transaction Costs

- Three characteristics of transactions affect the transaction costs: asset specificity, uncertainty and frequency.
- Transaction Cost Economics (TCE) Theory:
 - When transaction cost are low, use the spot market governance
 - When transaction costs are high, Hierarchy is efficient
- In between market and hierarchy, there is the governance structure *hybrid*.

Asset Specificity & Ecosystem

- **Supply chain** specific assets
 - Good relationships between members of network or cluster
 - Assets such as specific dies, molds, and tooling for the manufacture
- **Resources:** The human, clusters, financial institutions etc. ports and airports, Location specific assets
- **Institutions** : create benefits to companies in taxes and tariffs , by creating special economic zones, special universities for training manpower, etc
- **Delivery Infrastructure** : **Ports, Airports, Rail roads, Highways** Special trucks for carrying finished vehicles and heavy power plant equipment such as boilers, Temperature controlled warehouses, refrigerated vehicles, Forklift trucks, guidance systems, etc.
- Some of these costs are not flexible or transferable across products or organizations: Infrastructure created, Manpower trained, Costs of attracting 3 PLs, Software providers

Frequency and Uncertainty

- “Frequency of interactions” between the buyer and supplier is important for reasons of economies of scale
 - To recover the costs of specialized mechanisms created and establishing relations with partner’s network partners
 - For transfer of tacit knowledge in customized exchanges
- "Environmental uncertainty" can come from suppliers, customers, competitors, regulatory agencies, unions, or financial markets, etc
 - The mode of governance used to coordinate partners depends on the sources of uncertainty . High uncertainty recommends hierarchy

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Coordination

Coordination

- Determining who does what and when and communicating to everyone
- The coordination includes Software based method for
 - For every order, selecting of suppliers; assigning functions to them such as what to supply, how is it to be produced (e.g., product tolerances and process standards), the production and delivery schedules , etc given the product specification and communicating to the chain partners.
- Supply Chain Planning Software will be helpful here

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Building The Control Tower

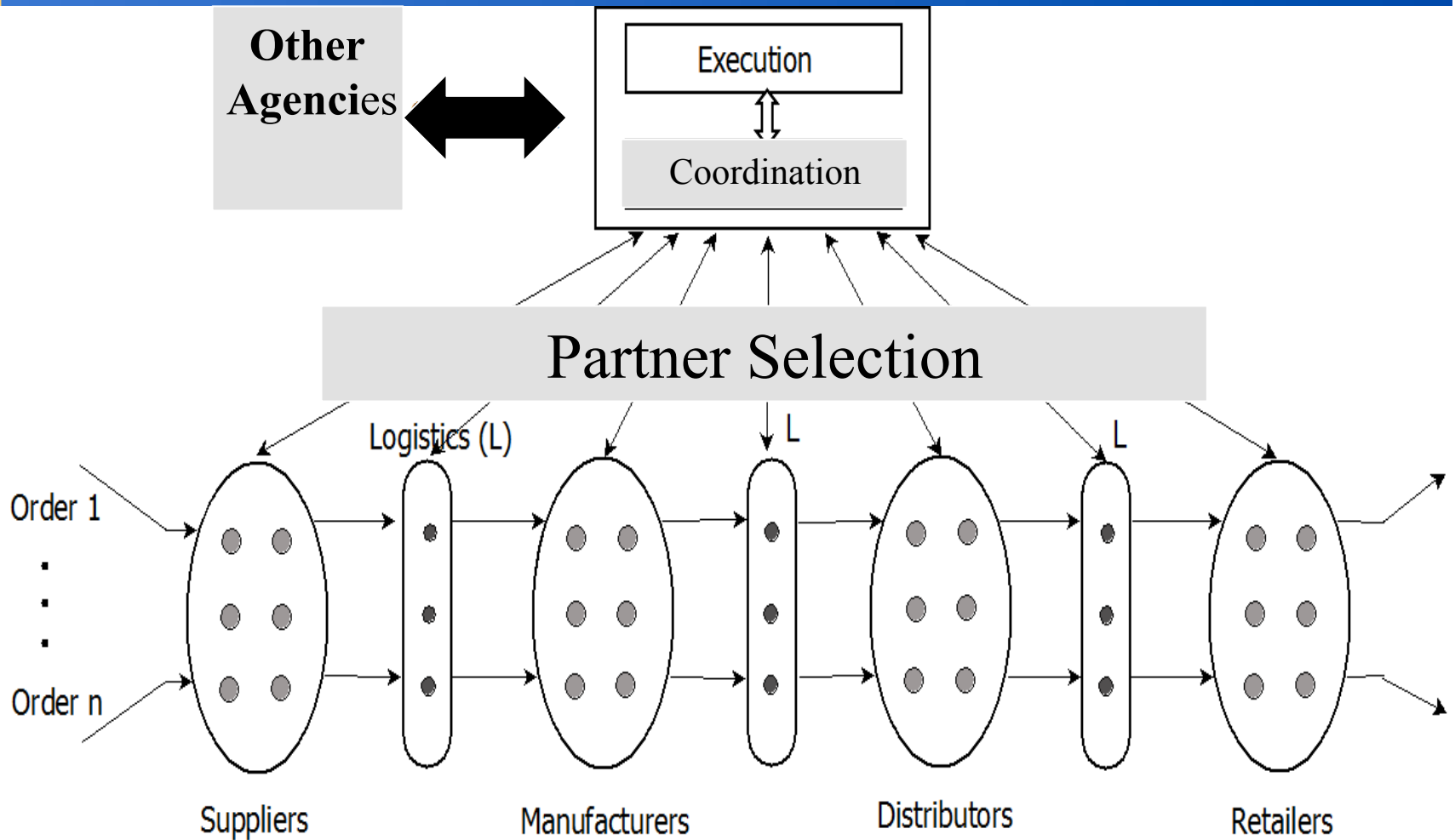
Design of Control Tower

- Cloud computing, Big Data Analytics are fundamental in this step
- Expert systems, Decision support systems, Case based reasoning and Hybrid control systems are useful for Exception Management and Execution
- Control Tower exist in Airlines, Power Networks, Rail Networks, etc.
- There are several applications such as 4 PLs, Monitoring and Execution using BPOs (Penske)

Execution : Online Supervisory Control

- 4PLs provide end to end B2B logistics services
- Coordinate all the services needed for the goods transfer
 - Warehousing at Shipper and Distributor Ends
 - Arrange for the trucks all the through the Journey
 - Manages the customs clearance at Ports or Airports
 - Loading and Unloading , Cross Docking, Merge in transit as required
 - Manage all exceptions through a control room: Truck failure, Truck registration, Payments at customs, Driver schedules, Expediting,.....

Governance: Partner selection, Coordination & Execution



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Talent

Talent for Supply Chain Management

- **The talent (soft skills, R & D, execution abilities, connections, domain knowledge) needed for each step in the supply chain design is different.**
 - The talent needed for the group working on *supply chain formation* is more knowledge and data intensive and requires domain industry knowledge, Political and economic factors of the countries or regions, strategy formulation, innovation and risk evaluation and finally use of analytical techniques for location selection and group formation.
 - *Project management* requires skills to interact and manage with the Government and local communities. Local connections and knowledge will help to get approvals quickly and resolve any dispute that may arise with land owners, local communities and labour unions.

Talent for Supply Chain Management

- *Coordination and Execution* steps could be routine during normal times and can be assisted with tools such as scheduling packages, geographical information systems and Call centers
- In emergency situations such as natural disasters, terrorist attacks or long drawn labour disputes, risk management teams assisted with decision support systems should come on board to resolve the crisis.

Jatasya maranam dhruvam: Same is true for Companies & Strategies

- No design, product, process, network, ecosystem is permanent. All of them keep evolving and your designs, products, processes, networks, ecosystems must evolve suitably to keep global competitiveness.

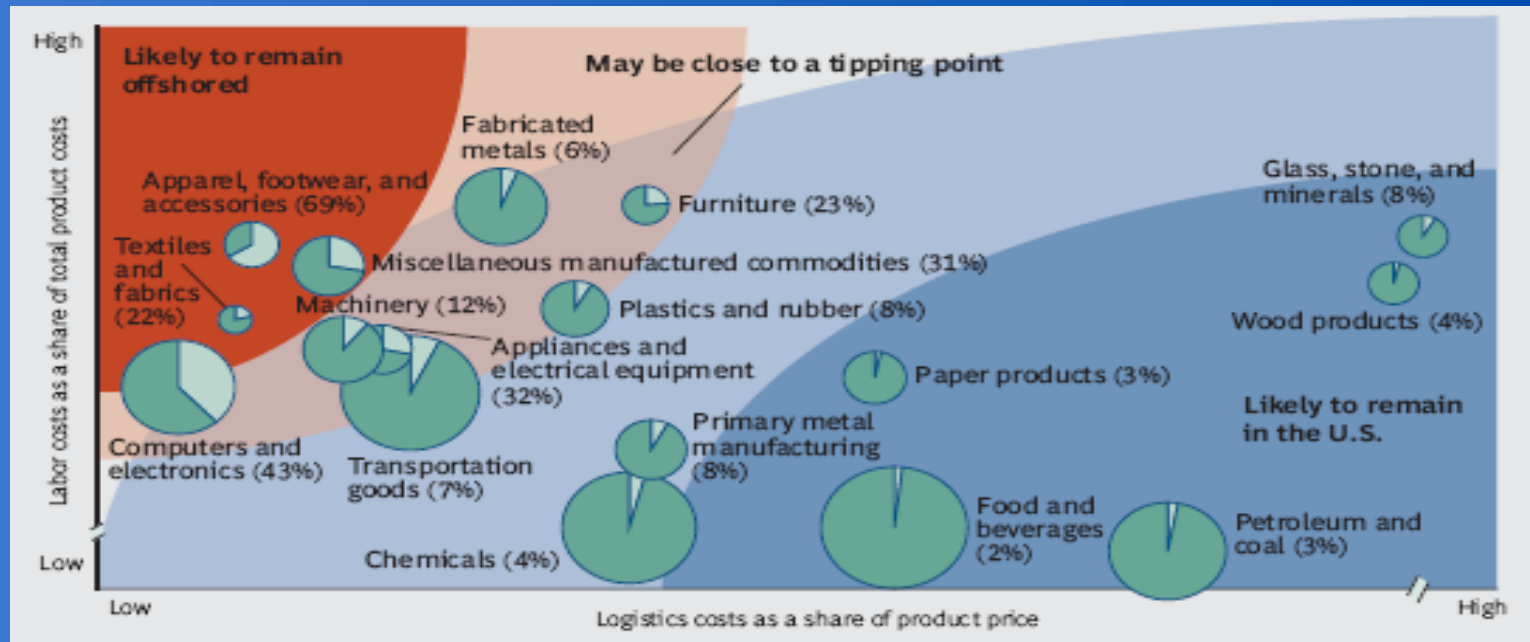
Conclusions

- Dispersed Supply network design involves **Formation and Governance**.
- Formation is very important step which is often ignored and creates operational problems to severe disruptions later.
- Capabilities for the Formation stage are much different from the Governance and may require relationships with government, trade, social groups, labour, resources owners and B2B and B2C delivery service providers.
- Implementation of the Governance needs sensor networks, big data management, cloud computing
- **Can be used with advantage for SMEs, Hospitals, Cities, Villages, etc.**
- **Theory development needs Integration of Social networks, Machine learning, Optimization, Game theory with SCNs.**

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We are seeing a turn around

Manufacturing retuning to US



- Basis for Global manufacturing footprint: Total costs of making products for markets
 - Worker productivity in countries
 - Labor & Logistics as a share of total costs
 - Hidden costs and risks
- The low cost advantage of China disappears with changed cost structure between China and the U.S.

The Future of Global Supply Chains

- An increase in objective and subjective transaction costs, from higher oil prices to "buy local" campaigns and murky protectionism (**government procurement in favor of local firms**), indicates that in the future, supply chains will probably be smaller and more regional.
 - Several companies such as Boeing are restructuring their supply chain