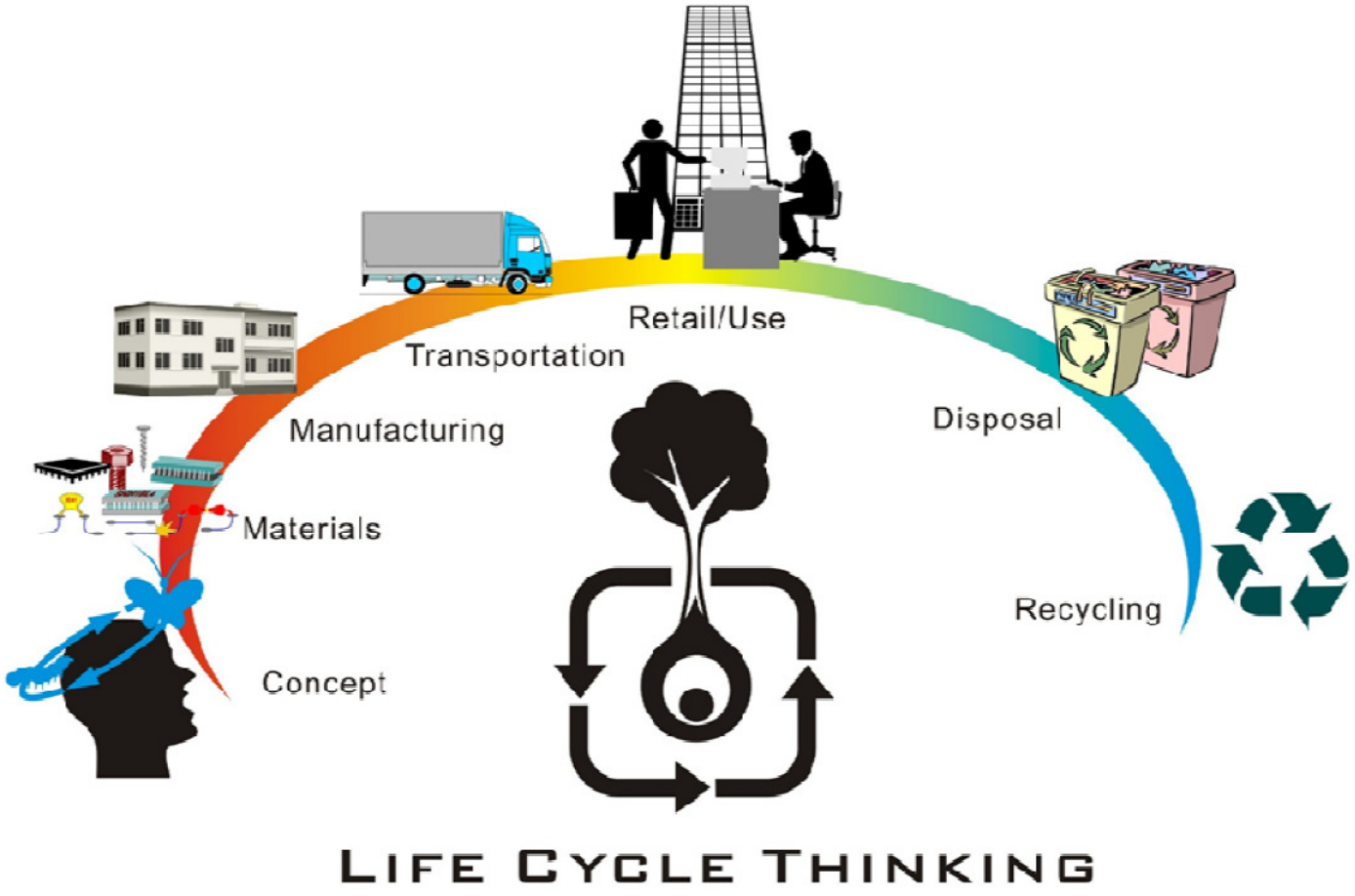


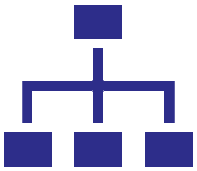
Framework for Developing and Managing Lean, Aglie and Sustainable Supply Chains

Pawan K. Taneja, Ph.D.
IIPA

Three Pieces Working Together

Lean, Agile
Sustainability

Supply Chain



Management

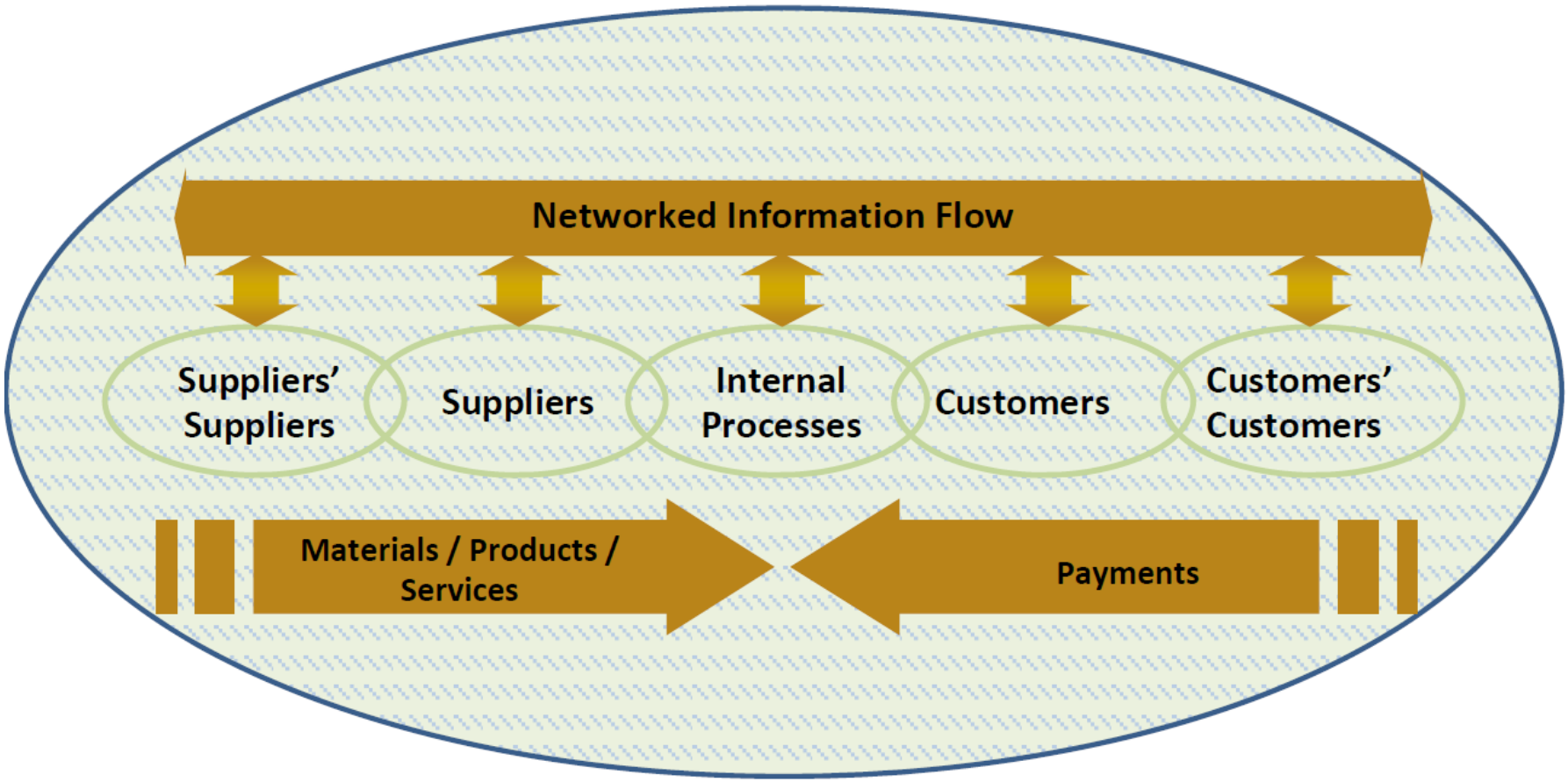
Lean Logic

Lean is based on the logic that nothing will be produced until it is needed

A sale pulls a replacement from the last position in the system

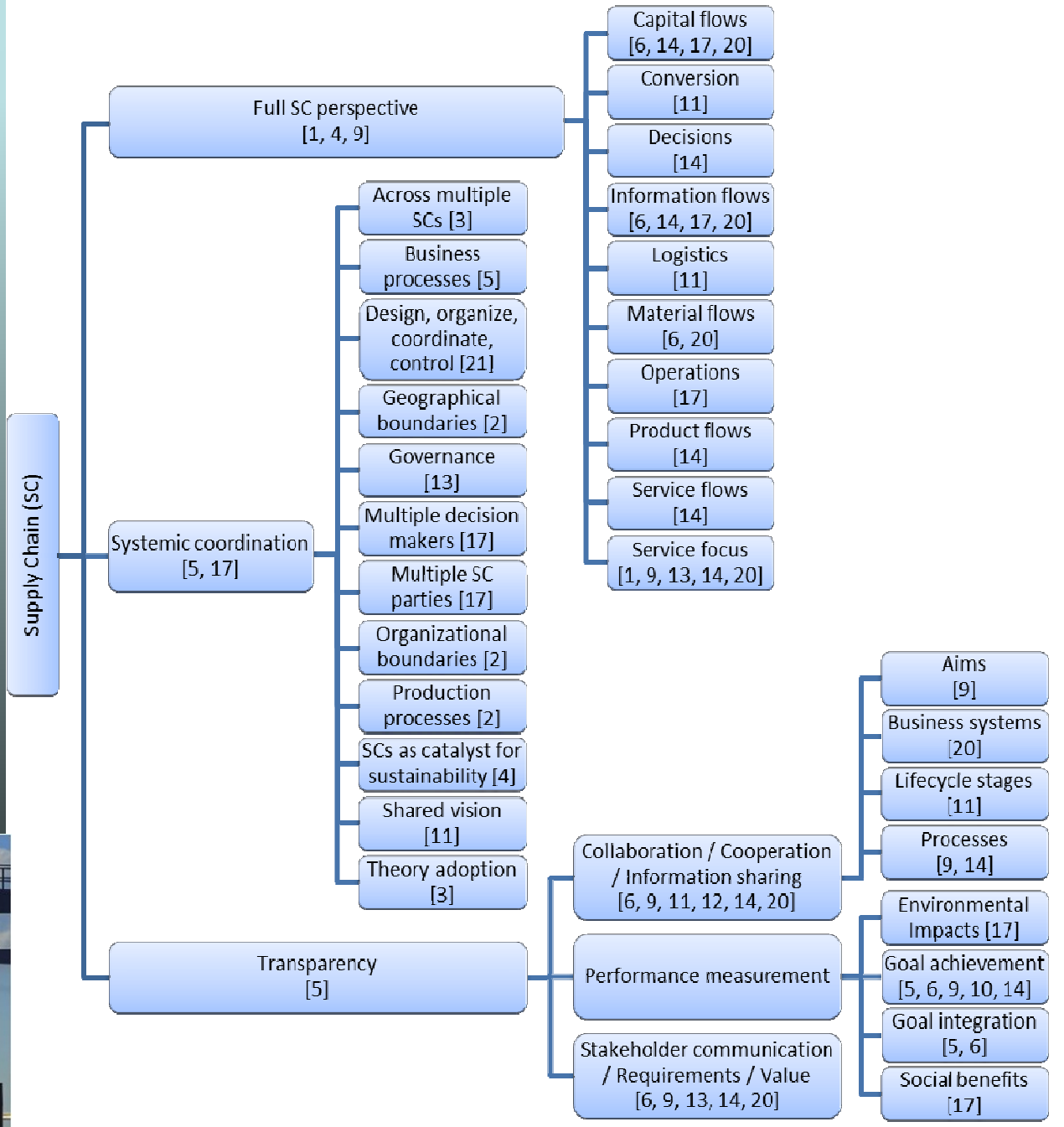
This triggers an order to the factory production line

Each upstream station then pulls from the next station further upstream



Supply Chain

Supply Chain



- Source: Reefke and Olsen, 2016

Lean-Focused Supply Chain Components

- Lean suppliers
  - Able to respond to changes
  - Lower prices
  - Higher quality
- Lean procurement
  - Key is automation (e-procurement)
  - Suppliers must see into the customers' operations and customers must see into their suppliers' operation
- Lean warehousing
  - Eliminate non-value-added steps and waste in storage process

Lean-Focused Supply Chain Components Continued

- Lean logistics
  - Optimized mode selection and pooling orders
  - Combined multi-stop truckloads
  - Optimized routing
  - Cross docking
  - Import/export transportation processes
  - Backhaul minimization
- Lean customers
  - Understand their business needs
  - Value speed and flexibility
  - Establish effective partnerships with suppliers

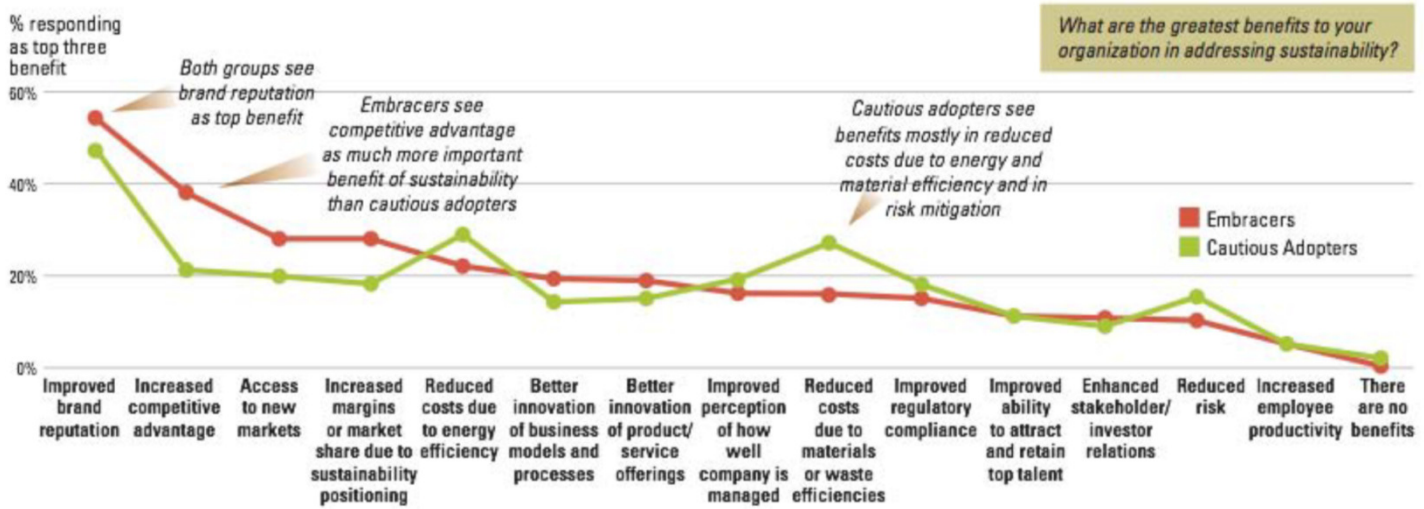
Comparison of Lean, Agile, and Lean and Agile Supply Chains

Aspects	*Lean Supply Chain*	*Agile Supply Chain*	*Lean and Agile Supply Chain*
Market demand	Predictable	Volatile	Volatile and unpredictable
Product variety	Low	High	Medium
Product life cycle	Long	Short	Short
Customer preference	Cost	Lead time and availability	Service level
Profit margin	Low	High	Moderate
Dominant costs	Physical costs	Marketability costs	Both
Stockout penalties	Long-term contractual	Immediate and volatile	No place for stockout
Purchasing policy	Buy goods	Assign capacity	Vendor-managed inventory

Comparison of Lean, Agile, and Lean and Agile Supply Chains

Aspects	*Lean Supply Chain*	*Agile Supply Chain*	*Lean and Agile Supply Chain*
Information enrichment	Highly desirable	Obligatory	Essential
Forecast mechanism	Algorithmic	Consultative	Both/either
Typical products	Commodities	Fashion goods	Product as per customer demand
Lead-time compression	Essential	Essential	Desirable
Elimination of wastefulness	Essential	Desirable	Arbitrary
Rapid reconfiguration	Desirable	Essential	Essential
Robustness	Arbitrary	Essential	Desirable

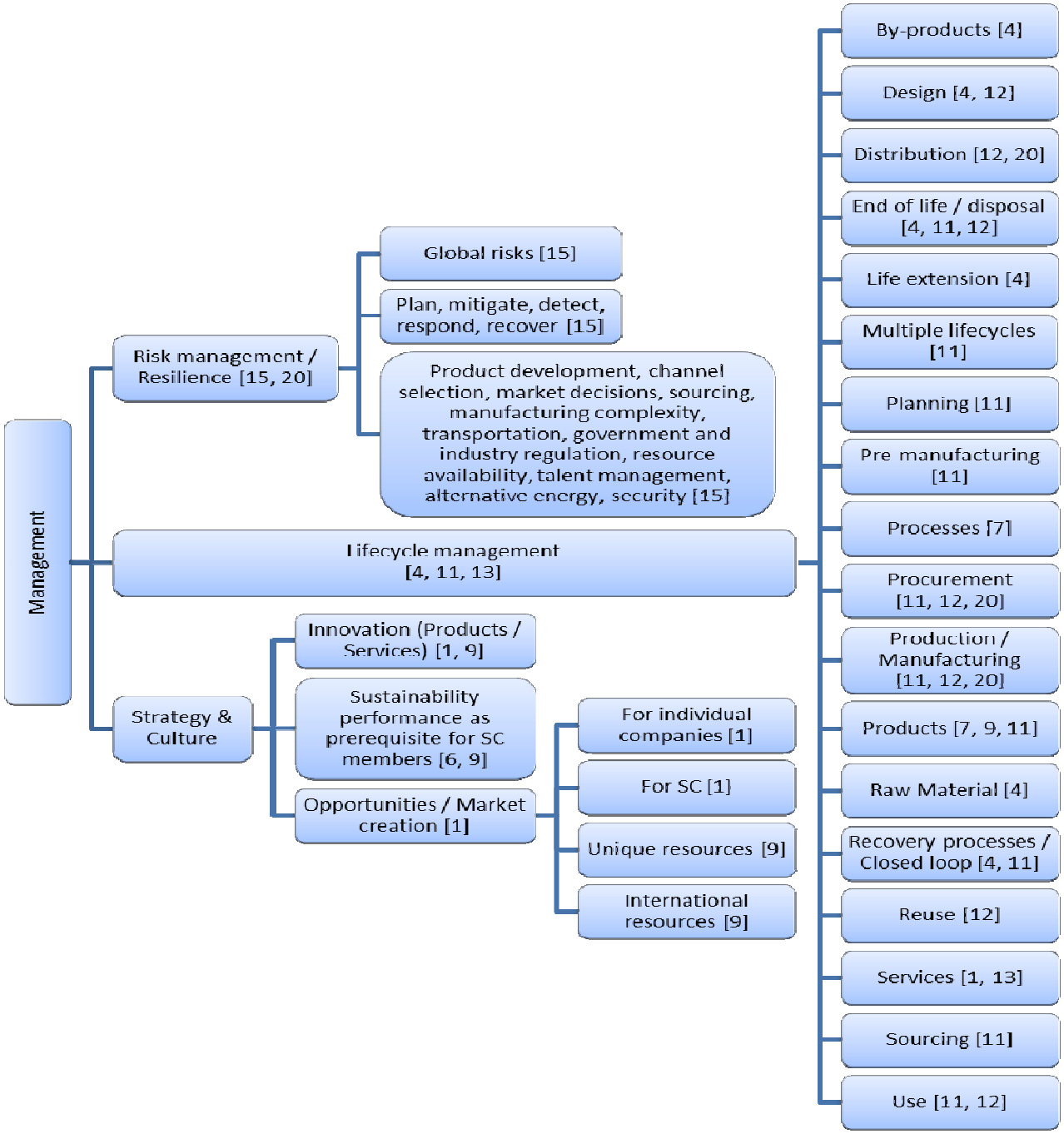
THE SUSTAINABILITY GAP: EMBRACERS VS. CAUTIOUS ADOPTERS



Sustainability

- Sustainability
  - Triple bottom line (TBL)
    - Create, protect, and grow [13]
    - Continue business forever [10]
    - Inter organization [14]
    - Intra-organization [14]
    - Long term [5, 13, 20]
    - Short term [20]
    - Voluntary TBL integration [20]
  - Economic performance / Value [1, 5]
    - Efficient resource usage [1]
    - Economic viability [10, 21]
    - Profitability / Competitive advantage [6, 9, 17 20]
      - Customer requirements [6, 9]
      - Individual company [5, 20]
      - Operations costs [17]
      - SC [5]
  - Environmental performance
    - Environmental impacts [1, 4, 17]
    - No harm to environmental systems [10, 21]
    - Waste reduction [1, 4]
  - Social performance
    - Customer value [1]
    - Inter generational ethics [19]
    - No harm to social systems [10, 21]
    - Social responsibility [1, 2]
    - Social well-being [17, 18]

Management



- Source: Reefke and Olsen, 2016

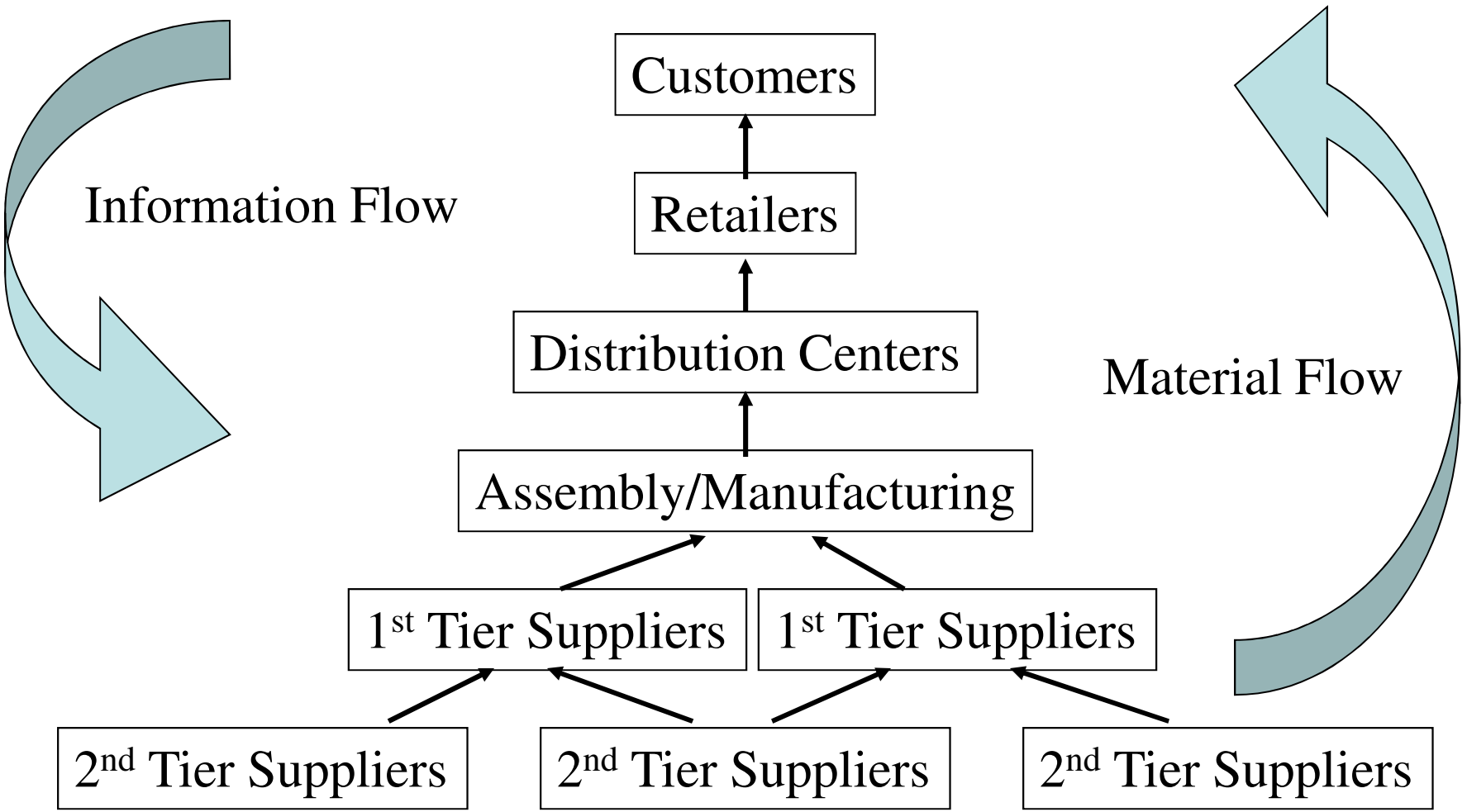
Supply Chain Management

- Mentzer et al. (2001) put forward that SCM has been defined from three different angles
  - A management philosophy
  - A set of activities for implementation
  - A set of management processes
- Similarly, the definitions of SSCM cover relevant aspects from different perspectives
  - That is, the definitions are not necessarily inconsistent with each other but rather attend to particular aspects

What is Important for Supply Chain Management?

FLOW

The Basic Supply Chain

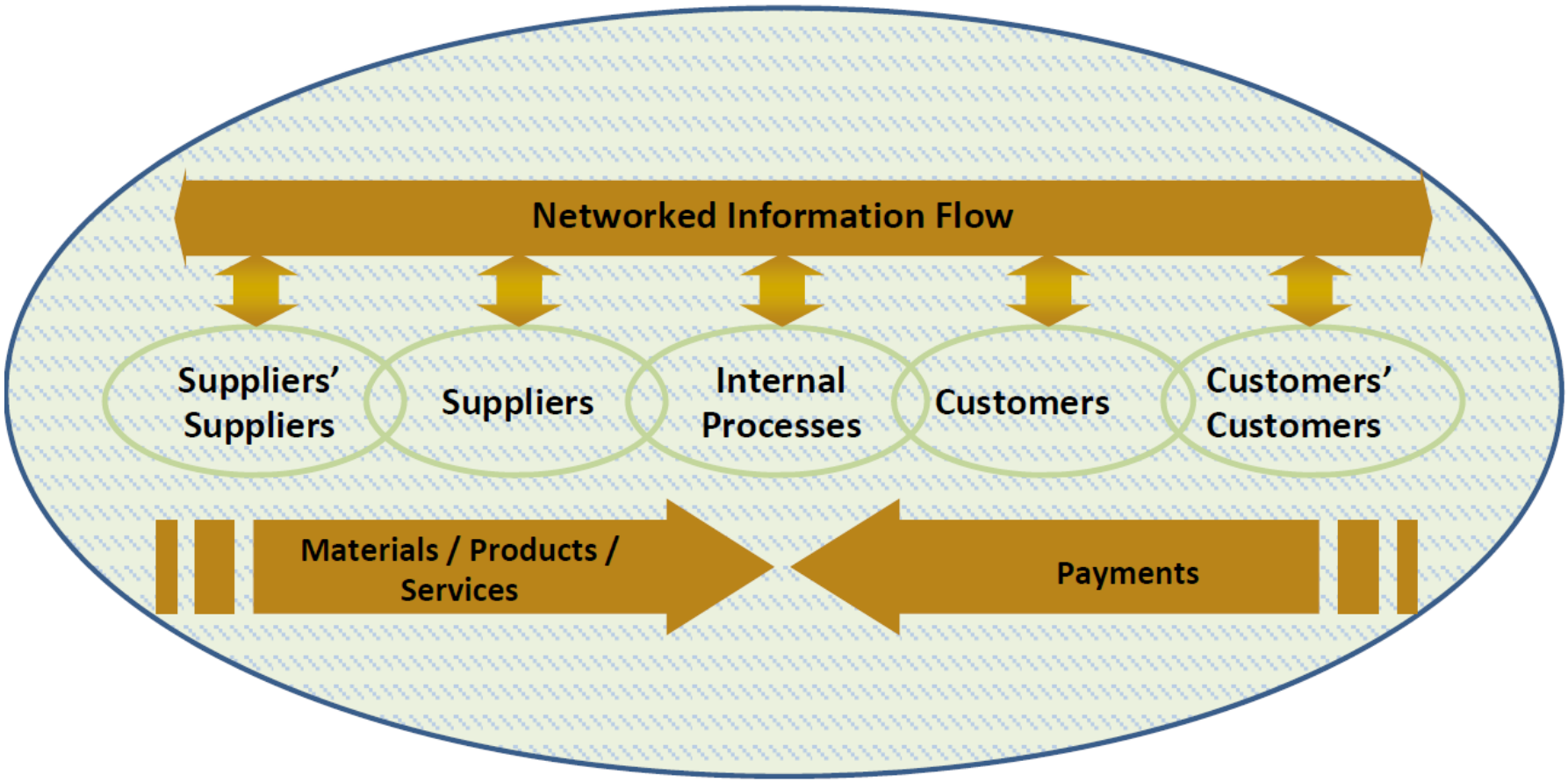


Strategic Sustainable Supply Chain

- Maintain desired Speed of 'FLOW' to ensure Competitive Advantage with sustainable approach
- Meeting the needs of the present without compromising the ability of future generations to meet their needs
- More than "going green" includes employees, customers, community, and company reputation

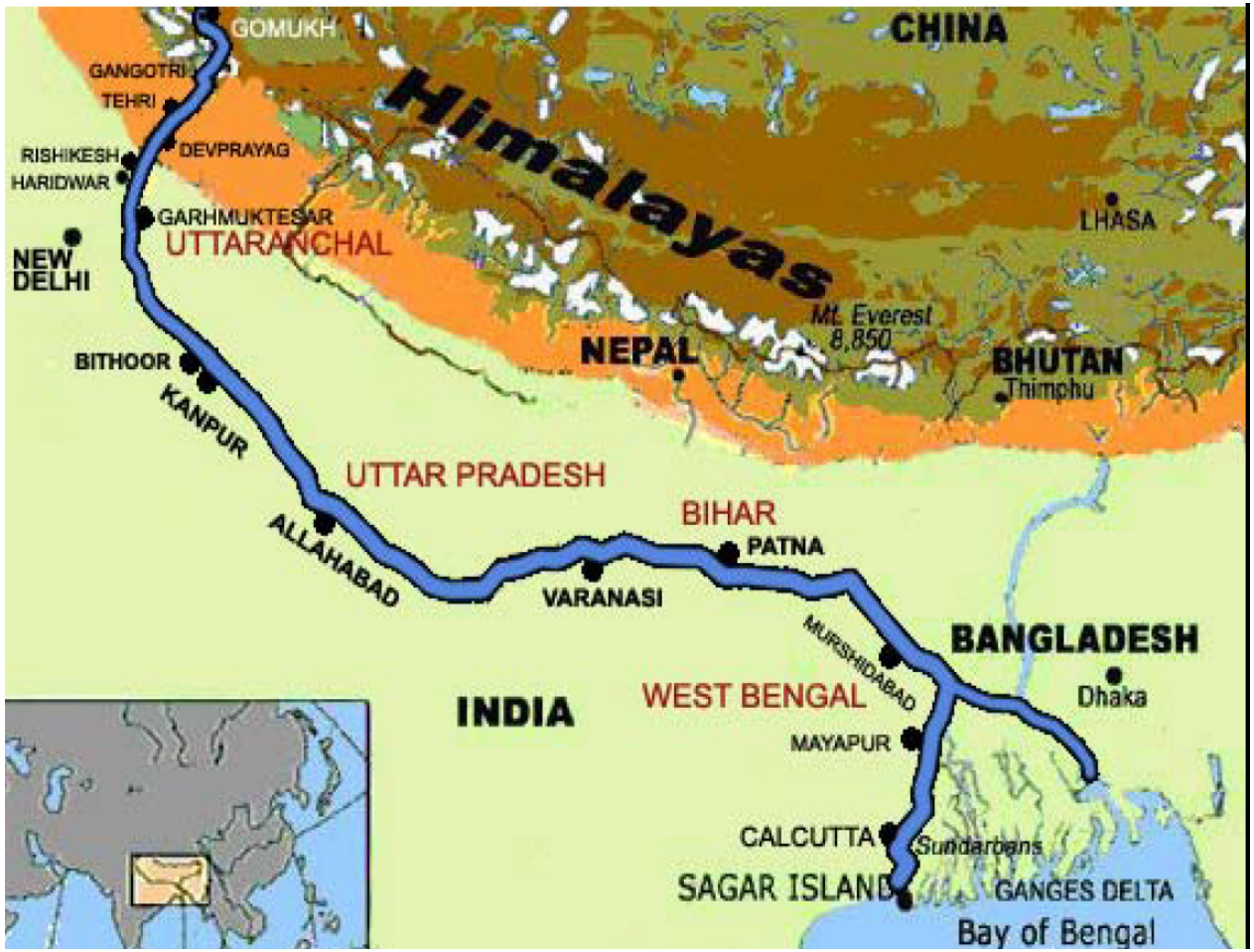
Add value while minimizing two types of costs

- Physical Production/Distribution Costs
  - Manufacturing costs
  - Transportation costs
  - Facility utilization rates
  - Inventory carrying cost on pipeline and cycle stock
- Supply/Demand Mismatch Costs
  - Lost revenue when demand exceeds supply
  - Product scrap when supply exceeds demand
  - Inventory carrying cost on safety stock

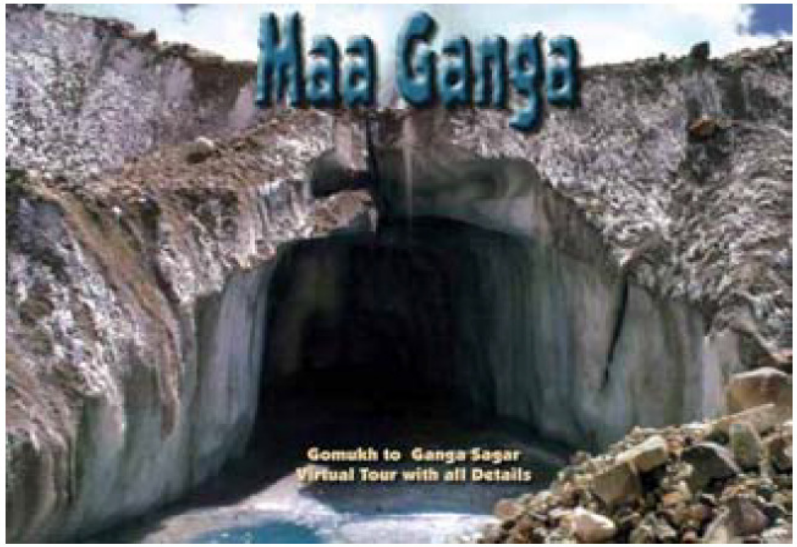


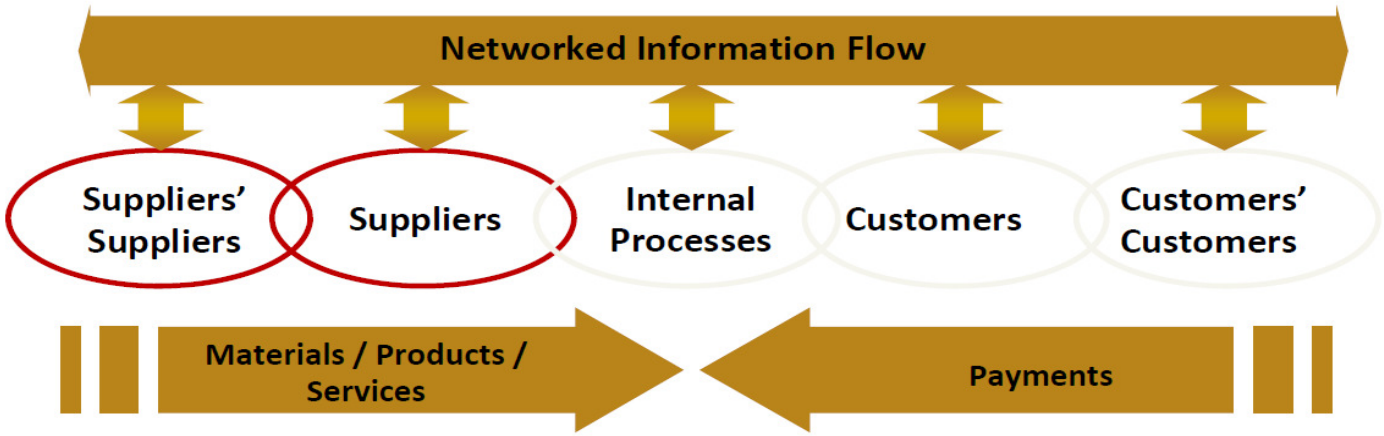
Developing Sustainable Supply Chain

SSCM: Learning from Ganga River

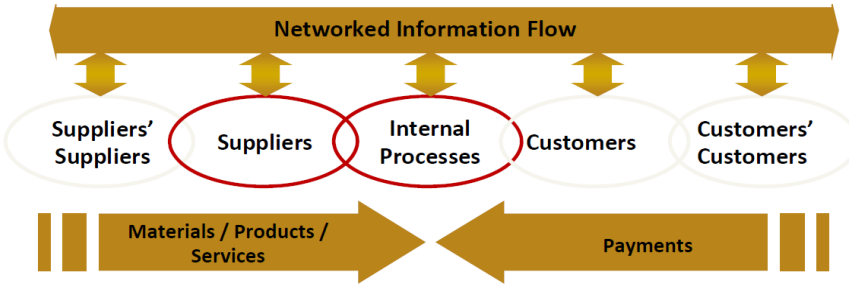


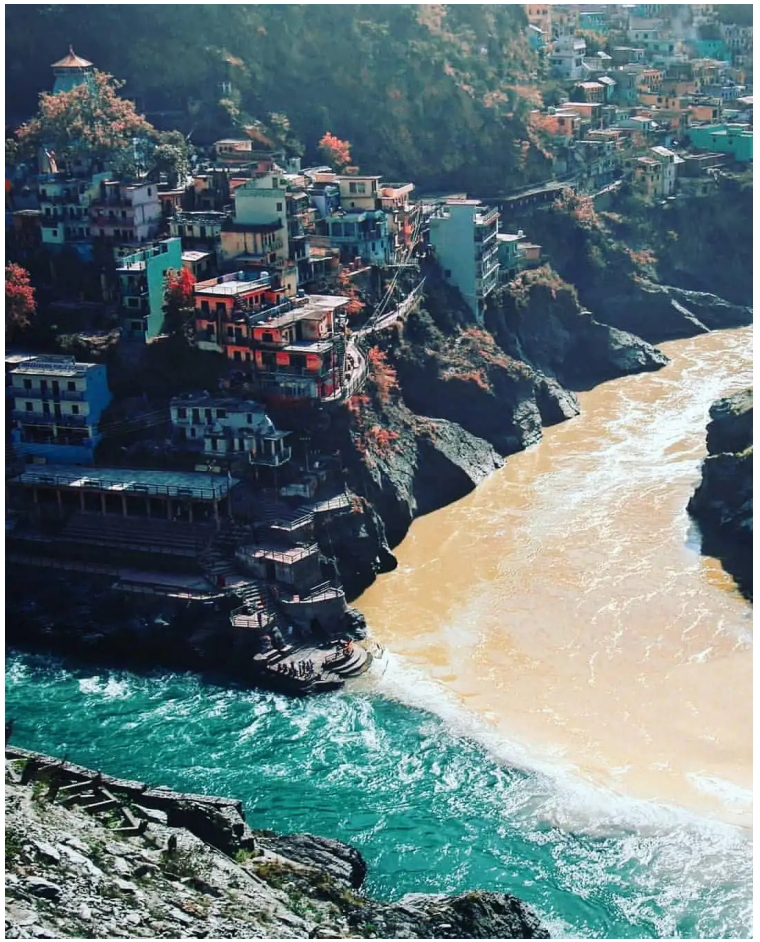
SSCM Lessons from Ganga Origin



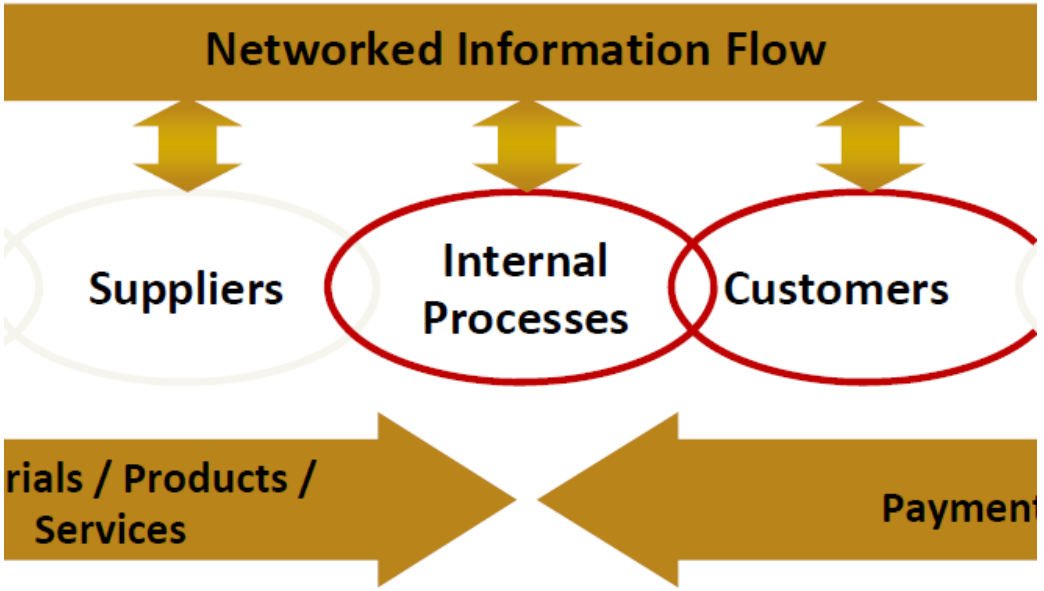


SSCM Lessons from Ganges – Panch Prayag

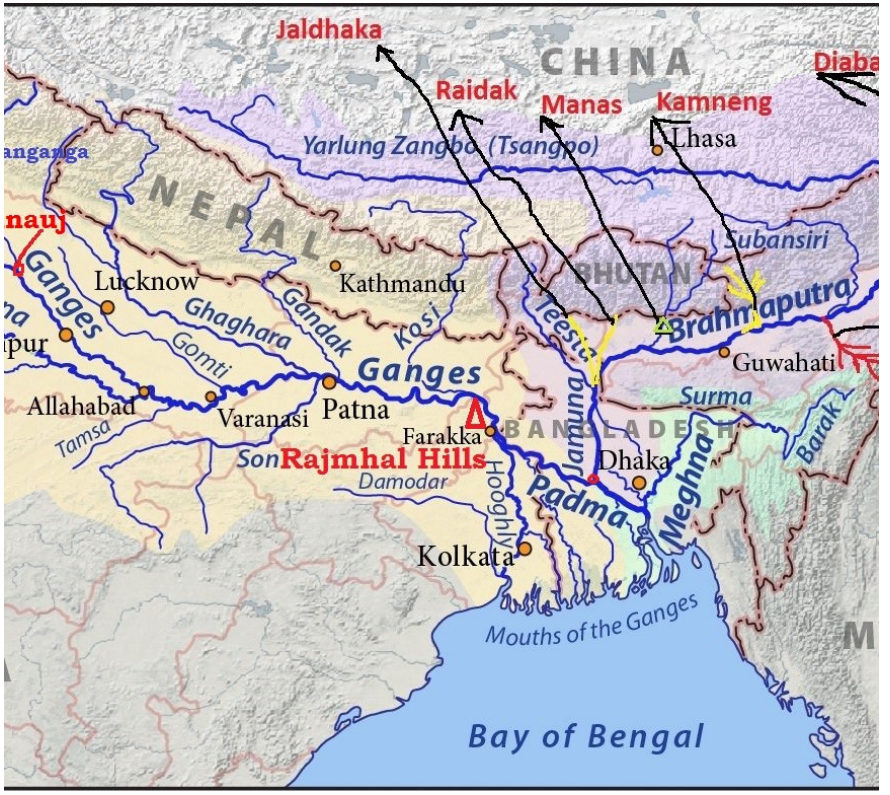




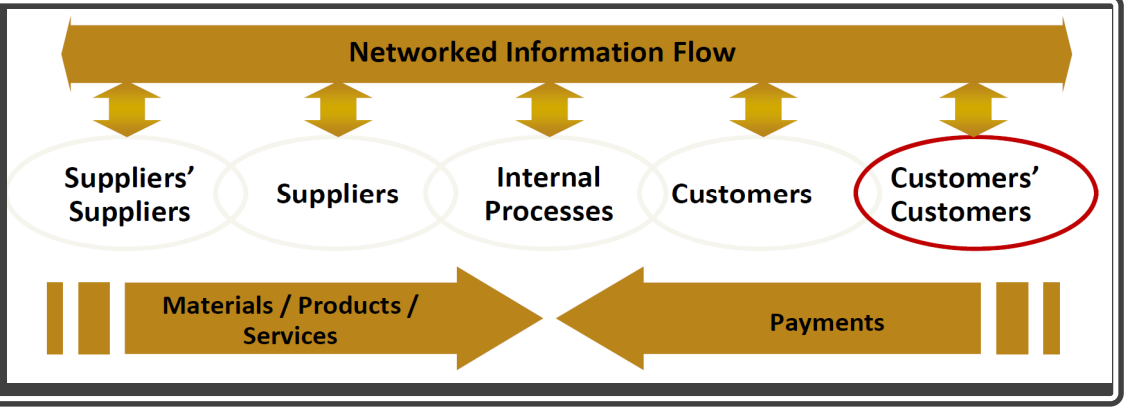
SSCM Leesons from Ganges at Haridwar



SSCM Leesons from Ganges at Prayagraj



SSCM Leesons from Ganges at Ganga Sagar



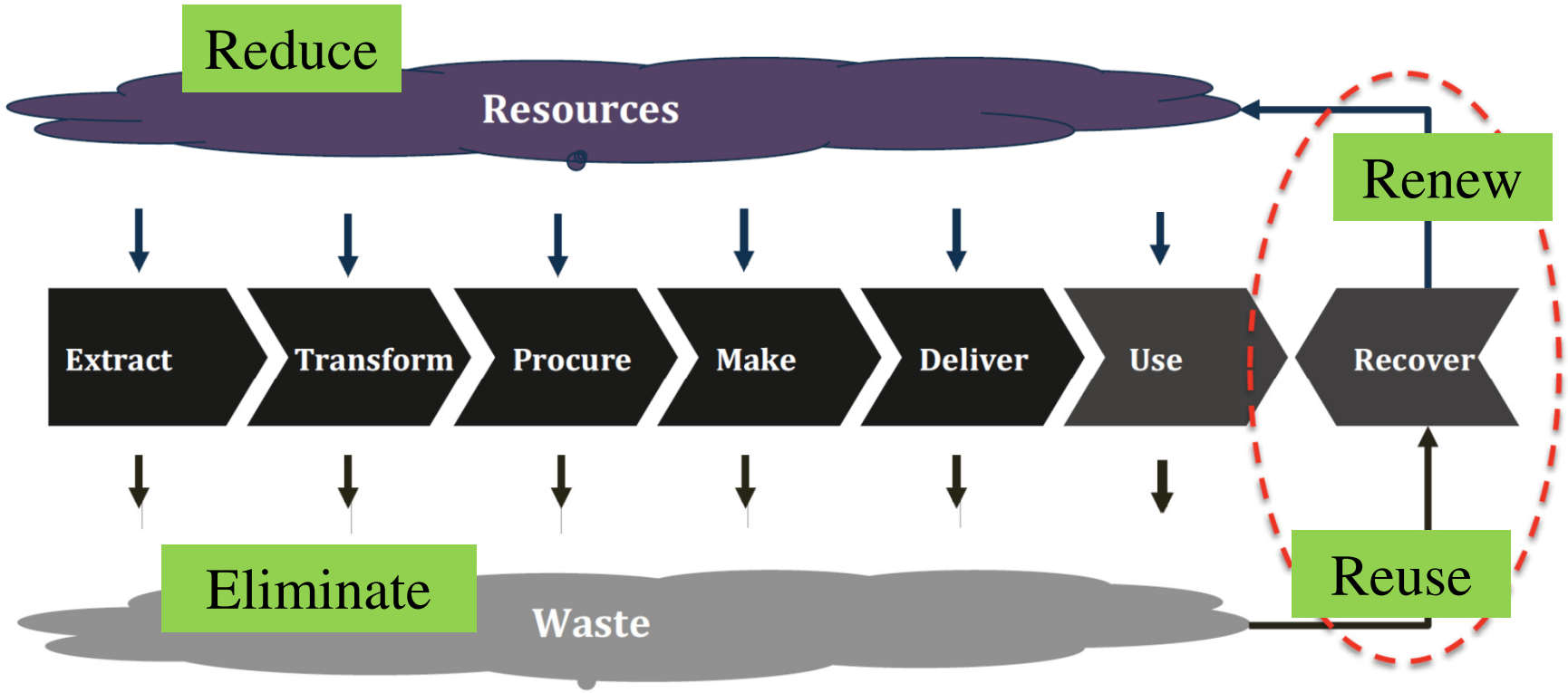
Group Exercise

Identify the Critical Strategies for SSCM: Sustainable 'FLOW' to ensure Competitive Advantage

Group 1 - Suppliers' Suppliers	Group 2 - Suppliers	Group 3 - Internal Processes	Group 4 - Customers	Group 5 - Customers' Customers

Each group to write 10 strategies – Total 10 x 5 = 50 Strategies

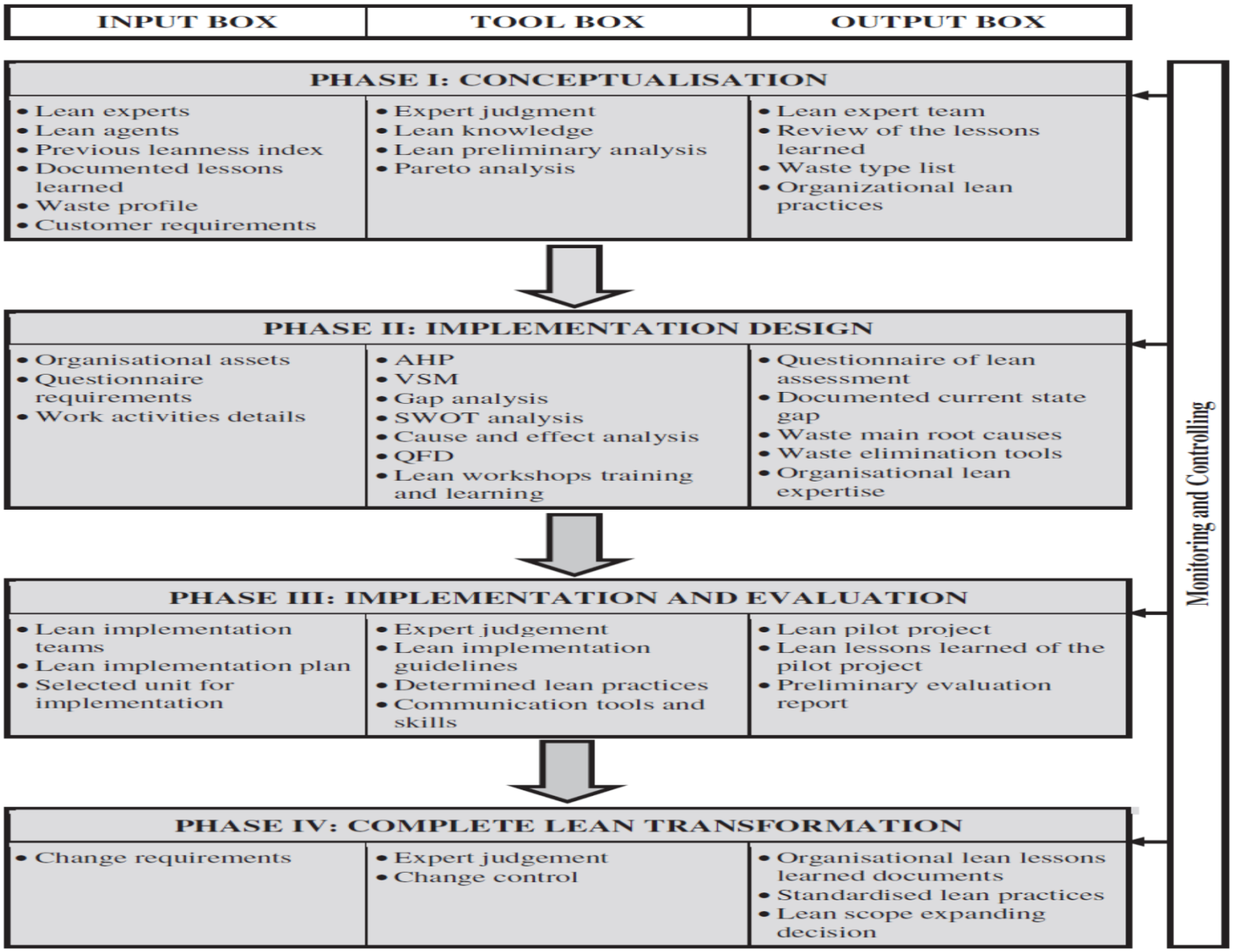
Developing Sustainable Supply Chain



Strategies to Build Resilience into the Supply Chain

- Increase Redundancy
- Build Flexibility
- Change Corporate Culture
- Top Decision Making in a Flat Structure
- Manufacturing Flexibility
- Well-Established Supplier Relationships

Framework for lean manufacturing implementation



Sherif Mostafa, Jantanee Dumrak & Hassan Soltan (2013) A framework for lean manufacturing implementation, Production & Manufacturing Research, 1:1, 44-64, DOI: 10.1080/21693277.2013.862159

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- https://www.linkedin.com/pulse/lessons-from-maa-ganga-dr-balvir-talwar/
- https://www.linkedin.com/pulse/confluence-bhagirathi-alaknanda-dr-balvir-talwar?trk=public_profile_article_view