Lean and Operations Management Post Pandemic - Challenges

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UNS UNIVERSITAS SEBELAS MARET

24th IEOM Industry Solutions and Industry 4.0

Flow of Talk

- Nature of International Operations Management
- Globalization of Supply Chains
- Definition of resilience and vulnerability elements
- Survey on Supply Chain Issues by McKinsey
- Digitalization
- Redesigning Supply Chains (BSG)
- Resilient Work Force Management
- Reconfigurable Supply Chain (RSC) Network
- Conclusions

Coronavirus outbreak has cost global value chains $50 billion in exports

04 March 2020

The impacts of the coronavirus (COVID-19) are being felt along global value chains as manufacturing slows in China, a new UNCTAD report finds.

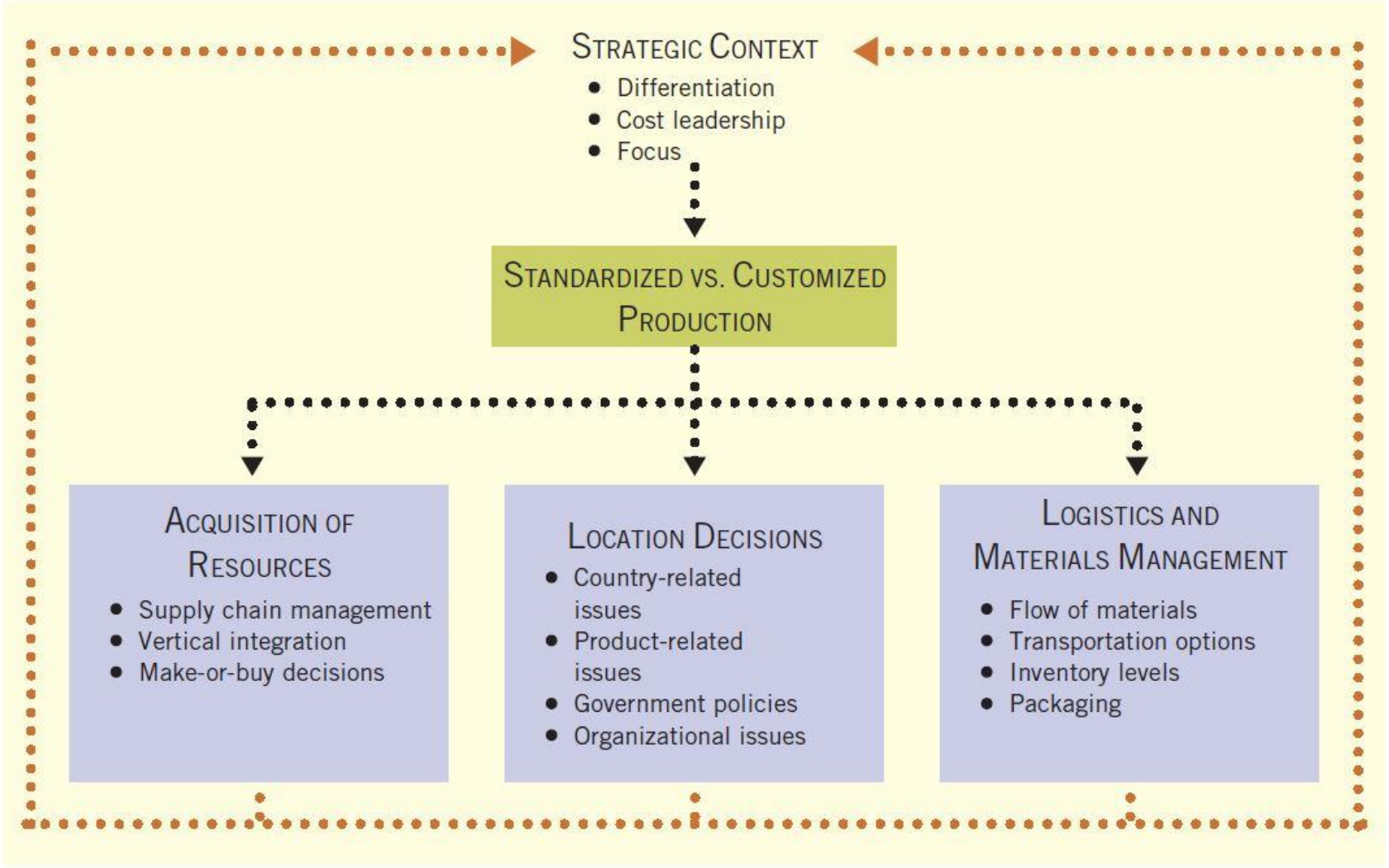
The slowdown of manufacturing in China due to the coronavirus (COVID-19) outbreak is disrupting world trade and could result in a $US50 billion decrease in exports across global value chains, according to estimates published by UNCTAD on 4 March.

In February, the country's manufacturing Purchasing Manager's Index (PMI) – a critical production index – fell by about 22 points to 37.5, the lowest reading since 2004. Such a drop in output implies a 2% reduction in exports on an annual basis.

Because China has become the central manufacturing hub of many global business operations, a slowdown in Chinese production has repercussions for any given country depending on how reliant its industries are on Chinese suppliers.

"In addition to grave threats to human life, the coronavirus

Nature of Global Operations Management



Source : Griffin, R.W.,Pustay, M.W., International Business – A Managerial Perspective, Pearson Global Edition, 2020

Supply Chain Risk and Mitigation Tactics

- Research and assess possible risks
- Innovative planning
- Reduce potential disruptions
- **Prepare responses for negative events**
- Flexible, secure supply chains
- Diversified supplier base

The IMPACT of the event was UNKNOWN as in Covid-19 case when it began

Source: Heizer, J., Render, B., Munson, C., Operations Management – Sustainability and Supply Chain Management, 12ed, Pearson, 2017

Supply Chain Risks and Tactics

RISK	RISK REDUCTION TACTICS	EXAMPLE
Supplier failure to deliver	Use multiple suppliers; effective contracts with penalties; subcontractors on retainer; pre-planning	**McDonald's** planned its supply chain 6 years before its opening in Russia. Every plant—bakery, meat, chicken, fish, and lett ensure strong links.
Supplier quality failure	Careful supplier selection, training, certification, and monitoring	**Darden Restaurants** h including third-party and logistics to ensur reduction of risk.
Logistics delays or damage	Multiple/redundant transportation modes and warehouses; secure packaging; effective contracts with penalties	**Walmart**, with its own truc distribution centers locate finds alternative origins an bypassing problem areas.
Distribution	Careful selection, monitoring, and effective contracts with penalties	**Toyota** trains its dealers around th principles of the Toyota Productio dealers improve customer service logistics, and body and paint oper
Information loss or distortion	Redundant databases; secure IT systems; training of supply chain partners on the proper interpretations and uses of information	**Boeing** utilizes a state-of-the-art i communication system that trans scheduling, and logistics data to Boeing facilities and suppliers worldwide.
Natural catastrophes	Insurance; alternate sourcing; cross-country diversification	**Toyota**, after its experience with fires, earthquakes, and tsunamis, now attempts to have at least two suppliers, each in a different geographical region, for each component.

Supply stop, demand changes, Product essential and non-essential

Lockdowns, Close Borders, Restricted Movements, Close Factories,

Pandemic – Health Issue

LIFE TIME

EVENT

Source: Heizer, J., Render, B., Munson, C., Operations Management – Sustainability and Supply Chain Management, 12ed, Pearson, 2017

Reimagining industrial supply chains

August 11, 2020 | Article

By Thomas Baumgartner, Yogesh Malik, and Asutosh Padhi

New!

For organizations that understand the vulnerabilities in industrial supply chains, there is an opportunity to prepare for future shocks and build resilience without hurting efficiency.

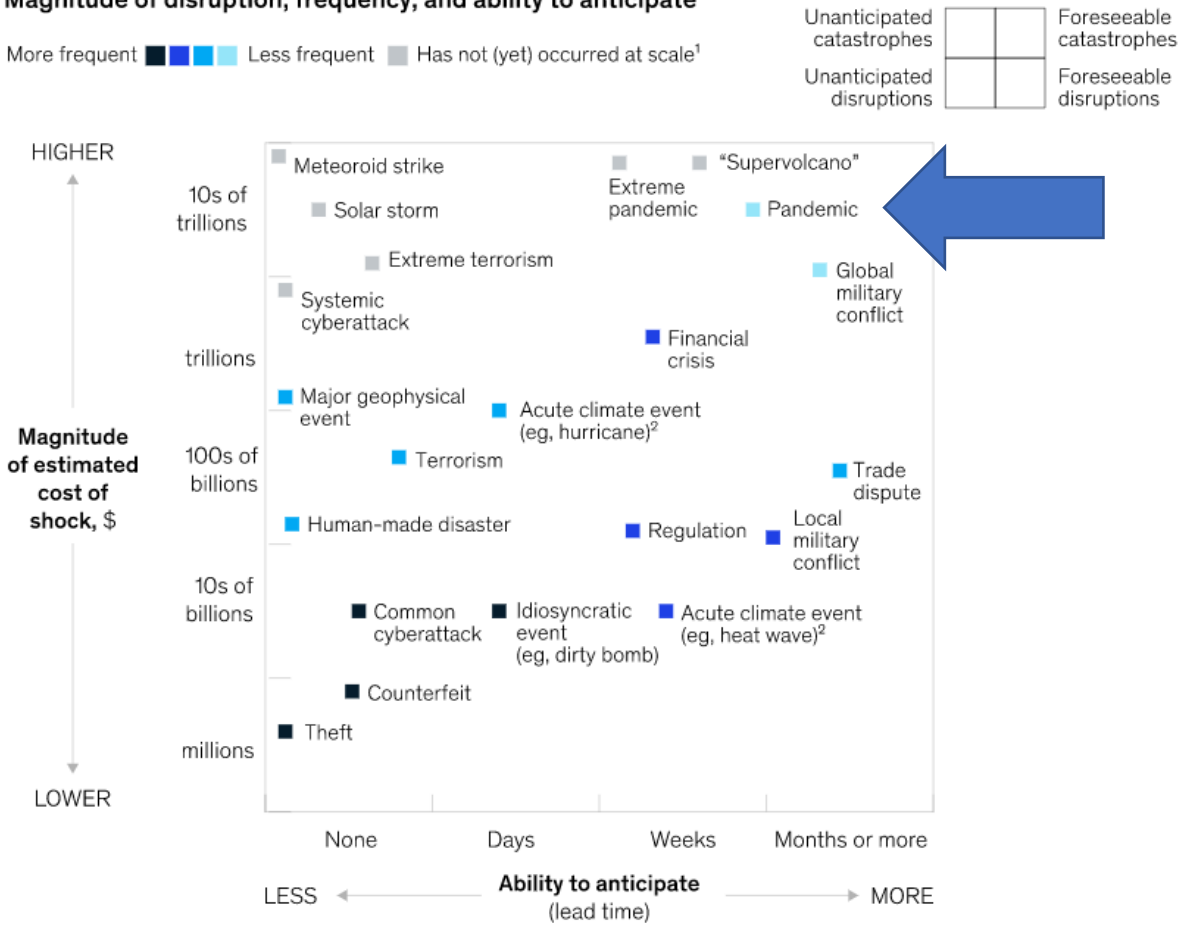
Expected frequency by duration, years (based on expert interviews, n = 35)

[1]Shocks that have not occurred either at scale (eg, extreme terrorism, systemic cyberattack, solar storm) or in modern times (eg, meteoroid strike, "supervolcano").
[2]Based on experience to date; frequency and/or severity of events could increase over time.
Source: McKinsey Global Institute analysis

McKinsey & Company

Disruptions vary based on their severity, frequency, and lead time—and they occur with regularity.

Magnitude of disruption, frequency, and ability to anticipate



The complexity of global industrial supply chains exponentially increases their risk. On average, an auto manufacturer has around 250 tier-one suppliers, but the number proliferates to 18,000 across the full value chain. Aerospace manufacturers have an average of 200 tier-one suppliers and 12,000 across all tiers. Finally, technology companies have an average of 125 suppliers in their tier-one group and more than 7,000 across all tiers.

Global Supply Chain – achieved economic efficiencies, cost minimization, efficient, just-in-time, BUT … not Robust to Global Pandemic

What Covid-19 has done to businesses (Shih, 2020)

Exposed vulnerabilities in production strategies and supply chains almost all countries

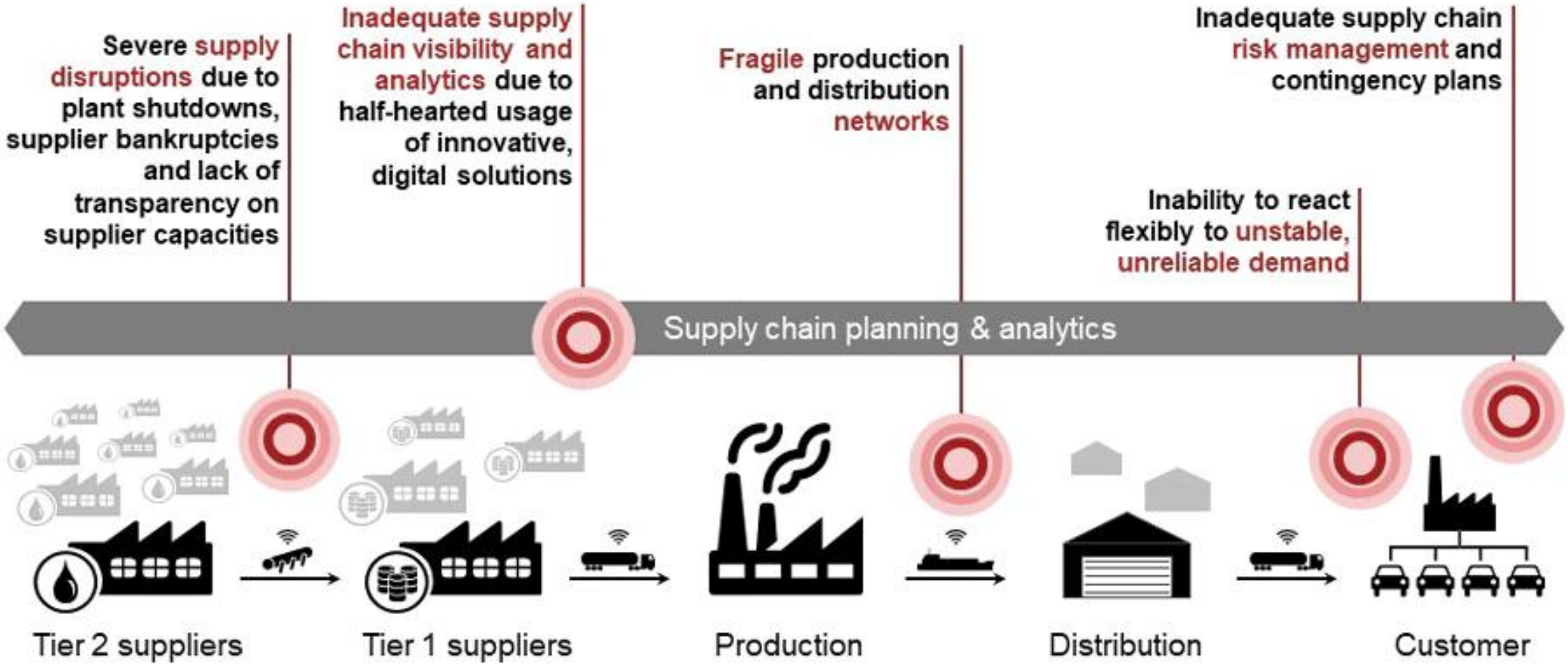
Compounded by temporary trade restrictions and shortages of pharmaceutical, critical medial supplies, other products from trade war triggered economic nationalism

Manufacturers under political and competitive pressure to increase domestic production, grow employment in home country

Need to reduce (or eliminate) dependence on sources (i.e., suppliers) that are perceived to be risky,

And re-think use of lean manufacturing strategies on minimizing amount of inventory held in global supply chains (Just in Time)

Vulnerabilities of chemical supply chains uncovered by COVID-19



Source: Strategy& analysis

DEFINITIONS OF RESILIENCE

Source	Definition	Field of study
Merriam-Webster (2007)	Capability of a body to ***recover its size and shape*** after deformation	Engineering
Folke et al. (2004)	***Ability to rebound*** from a disturbance while maintaining diversity, integrity and ecological processes	Ecology
Gorman et al. (2005)	***Ability to bounce back*** from adversity	Psychology
Stoltz (2004)	***Ability to bounce back*** from adversity and ***move forward*** stronger than ever	Leadership
Rice and Caniato (2003)	***Ability to react*** to an unexpected disruption and ***restore normal operations***	Supply chain
Sheffi (2005)	***Containment of disruption*** and ***recovery*** from it	Supply chain
Christopher and Peck (2004a)	Ability of a system to ***return to its original state*** or ***move to a new, more desirable state*** after being disturbed	Supply chain
Fiksel (2006)	Capacity for complex industrial systems to ***survive, adapt, and grow*** in the face of turbulent change	Supply chain

TABLE 2

VULNERABILITY FACTORS

Vulnerability Factor	Definition	Sub-Factors
Turbulence	Environment characterized by frequent changes in external factors beyond your control	Natural disasters, Geopolitical disruptions, Unpredictability of demand, Fluctuations in currencies and prices, Technology failures, Pandemic
Deliberate threats	Intentional attacks aimed at disrupting operations or causing human or financial harm	Theft, Terrorism/sabotage, Labor disputes, Espionage, Special interest groups, Product liability
External pressures	Influences, not specifically targeting the firm, that create business constraints or barriers	Competitive innovation, Social/Cultural change, Political/Regulatory change, Price pressures, Corporate responsibility, Environmental change
Resource limits	Constraints on output based on availability of the factors of production	Supplier, Production and Distribution capacity, Raw material and Utilities availability, Human resources
Sensitivity	Importance of carefully controlled conditions for product and process integrity	Complexity, Product purity, Restricted materials, Fragility, Reliability of equipment, Safety hazards, Visibility to stakeholders, Symbolic profile of brand, Concentration of capacity
Connectivity	Degree of interdependence and reliance on outside entities	Scale of network, Reliance upon information, Degree of outsourcing, Import and Export channels, Reliance upon specialty sources
Supplier/Customer disruptions	Susceptibility of suppliers and customers to external forces or disruptions	Supplier reliability, Customer disruptions

TABLE A-2

SUPPLY CHAIN RESILIENCE FRAMEWORK — VULNERABILITIES

Main Factors of Vulnerability	Descriptors	Svennson (2000)	Hamel and Valikangas (2003)	Christopher, Rutherford (2004)	Peck (2005)	Sheffi (2005)
Turbulence	Natural disasters	X		X	X	X
	Exposure to geopolitical disruptions		X		X	X
	Unpredictability of demand	X	X		X	X
	Fluctuations in currencies & prices					
	Unforeseen technology failures					
	Pandemic					
Deliberate threats	Piracy & theft					
	Terrorism & sabotage					
	Labor disputes					
	Industrial espionage					
	Special interest groups					
	Product liability					
External pressures	Innovation (competition)					
	Social/Cultural changes					
	Political/Regulatory changes					
	Price pressures (competition)					
	Corporate responsibility					
	Environmental changes					
Resource limits	Supplier capacity					
	Production capacity					
	Distribution capacity					
	Raw material availability					
	Utilities availability					
	Human resources					
Sensitivity	Complexity					
	Product purity					
	Restricted materials					
	Fragility					
	Reliability of equipment					
	Potential safety hazards					
	Visibility of disruption to stakeholders					
	Symbolic profile of brand					
	Concentration of capacity					
Connectivity	Scale/Extent of supply network					
	Reliance upon information flow					
	Degree of outsourcing					
	Import/Export channels					
	Reliance upon specialty sources					
Supplier/Customer disruptions	Supplier trust, loyalty, relations, reliability					
	Customer disruptions					

Main Factors of Capability	Descriptors	Cranfield (2002, 2003)	Hamel and Valikangas (2003)	Rice and Caniato (2003)	Fiksel (2003)	Peck (2005)
Flexibility-sourcing	Input commonality					
	Modularity and interchangeability			X		
	Multiple uses for supplies			X		
	Supplier contract flexibility	X	X	X	X	X
	Multiple sources	X	X	X	X	X
Flexibility-fulfillment	Alternate distribution channels		X	X		X
	Risk pooling/sharing					
	Multi-sourcing (peak vs. base)					
	Delayed commitment, Production postponement					
	Inventory management					
	Fast re-routing of requirements					
Capacity	Reserve capacity (materials, assets, labor, inventory)	X		X		X
	Redundancy (assets, labor)	X		X		
	Backup energy sources/communications					
Efficiency	Waste elimination	X			X	
	Labor productivity					
	Asset utilization					
	Product variability reduction					
	Failure prevention					
Visibility	Business intelligence gathering	X				
	Information technology	X		X		X
	Products, Assets, People visibility	X		X		X
	Collaborative information exchange					
Adaptability	Fast re-routing of requirements			X		
	Process Improvement, Lead time reduction	X		X	X	X
	Strategic gaming & simulation				X	X
	Seizing advantage from disruptions					
	Alternative technology development				X	X
	Learning from experience, Reengineering					X
Anticipation	Monitoring early warning signals			X		X
	Forecasting	X				X
	Deviation, Near-miss analysis					X
	Contingency planning, Preparedness (Training/Drill/Exercise plans)			X		
	Risk management, Business continuity planning	X		X	X	
	Recognition of opportunities					
Recovery	Crisis management	X		X		
	Resource mobilization					
	Communications strategy					
	Consequence mitigation					
Dispersion	Distributed decision-making				X	
	Distributed capacity & assets	X	X	X	X	

Pettit, T.J., Fiksel, J., and Croxton, K.L., (2010), Ensuring Supply Chain Resilience: Development of a Conceptual Framework
Journal Of Business Logistics, Vol. 31, No. 1, 2010, pp. 1-21

Survey on Issues of Supply Chain on Covid-19 - McKinsey

Supply-chain leaders say that the issues COVID-19 revealed will transform supply chains.

Respondents, %

73%
Encountered problems in the **supplier footprint** that require changes in the future

75%
Faced issues in the **production and distribution footprint** that require changes in the future

48%
Experienced delays in **planning decisions** because of remote working

85%
Struggled with insufficient **digital technologies** in the supply chain

Source: McKinsey surveys of global Supply Chain leaders (May 15 – May 22, 2020, N=60)

McKinsey & Company

Source : https://www.mckinsey.com/business-functions/operations/our-insights/resetting-supply-chains-for-the-next-normal

Supply-chain leaders expect to focus on resilience and digitization.

93% Plan to **increase resilience** across the supply chain

- 53% Dual sourcing of raw materials
- 47% Increasing inventory of critical products
- 40% Near-shoring and increasing supplier base
- 38% Regionalizing supply chains

54% Expect changes to **supply-chain planning** after COVID-19

- 58% Centralizing supply-chain planning
- 50% Retaining faster S&OP[1] cycle
- 60% Implementing advanced analytics

90% Plan to increase digital **supply-chain talent** in-house

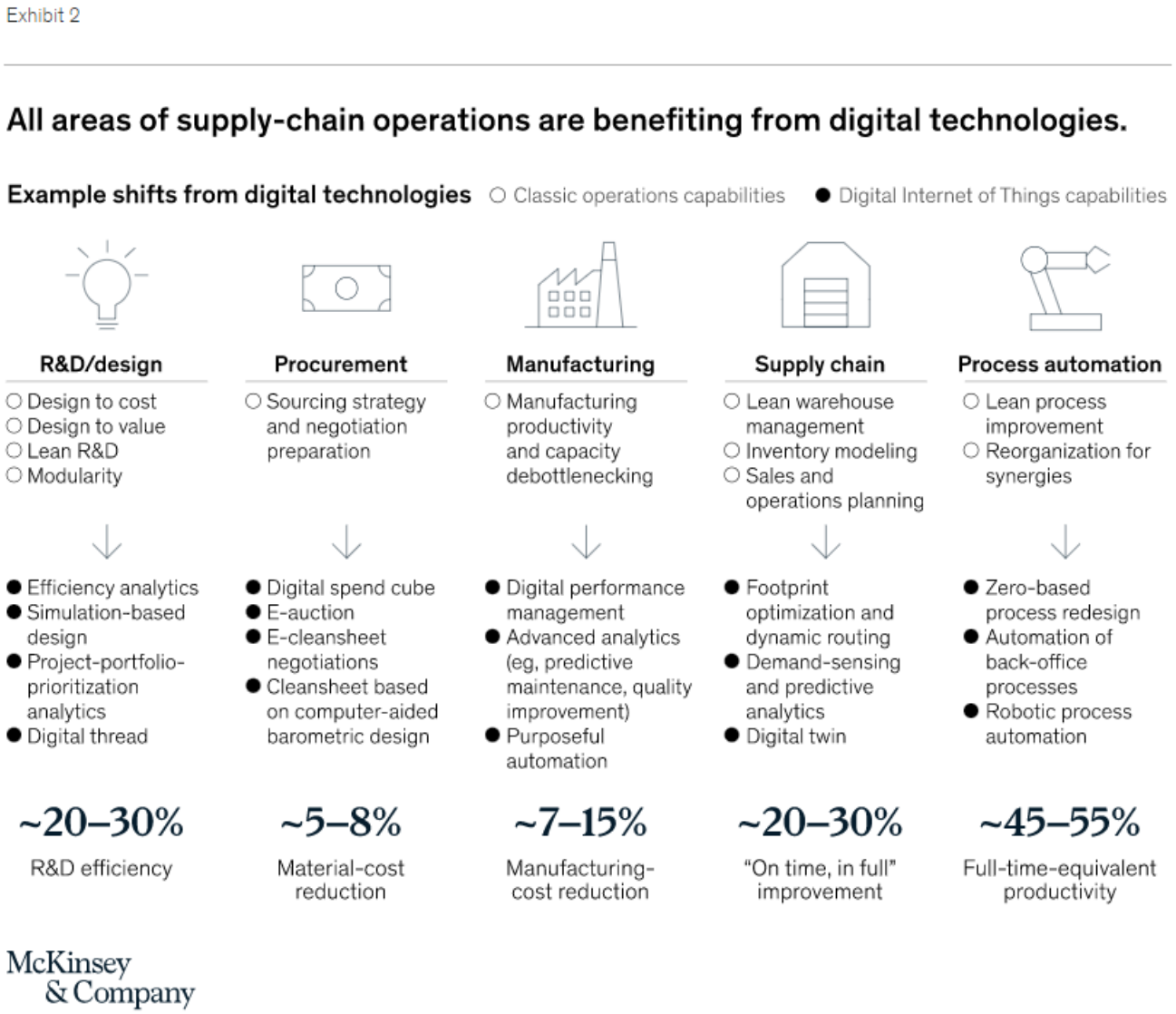
- 70% Reskilling today's labor force
- 55% Acquiring new talent from the labor market

11% Face budget constraints in transforming supply chains

[1]Sales and operations planning

Digitalization

- Building supply-chain resilience through digitization
- Use disruptive technologies – AI, Digitalized Supply Chain Network
- Logistics and Materials Management
- Warehousing, Shipment. Manufacturing Execution System
- CAD/CAM/FMS, Robots and Automation,
- Smart Factories
- Related IR 4.0 technologies – Additive Manufacturing, 3D printing,
- Digital Lean Systems – integrated VSM with Scenarios
- Smart Supplier Information System (just coined)



Modified from: https://www.mckinsey.com/industries/advanced-electronics/our-insights/reimagining-industrial-supply-chains

Designing Resilience into Global Supply Chains

AUGUST 03, 2020

By Ben Aylor, Bitan Datta, Megan DeFauw, Marc Gilbert, Claudio Knizek, and Michael McAdoo

“

With massive value at stake, global enterprises are seeking to mitigate risk and secure better access to supplies and markets.

- Exploring ways to build more resilience in manufacturing and **supply networks**—even at extra costs
- Seeking to **mitigate risk** and secure better access to supplies and markets
- Exploring options for diversifying and **regionalizing** their manufacturing and supply networks
- Adding **backup** production and distribution capacity, and **reoptimizing inventory**
- Also improving supply chain flexibility, risk-monitoring capabilities, and capacity to respond rapidly to **new shocks**

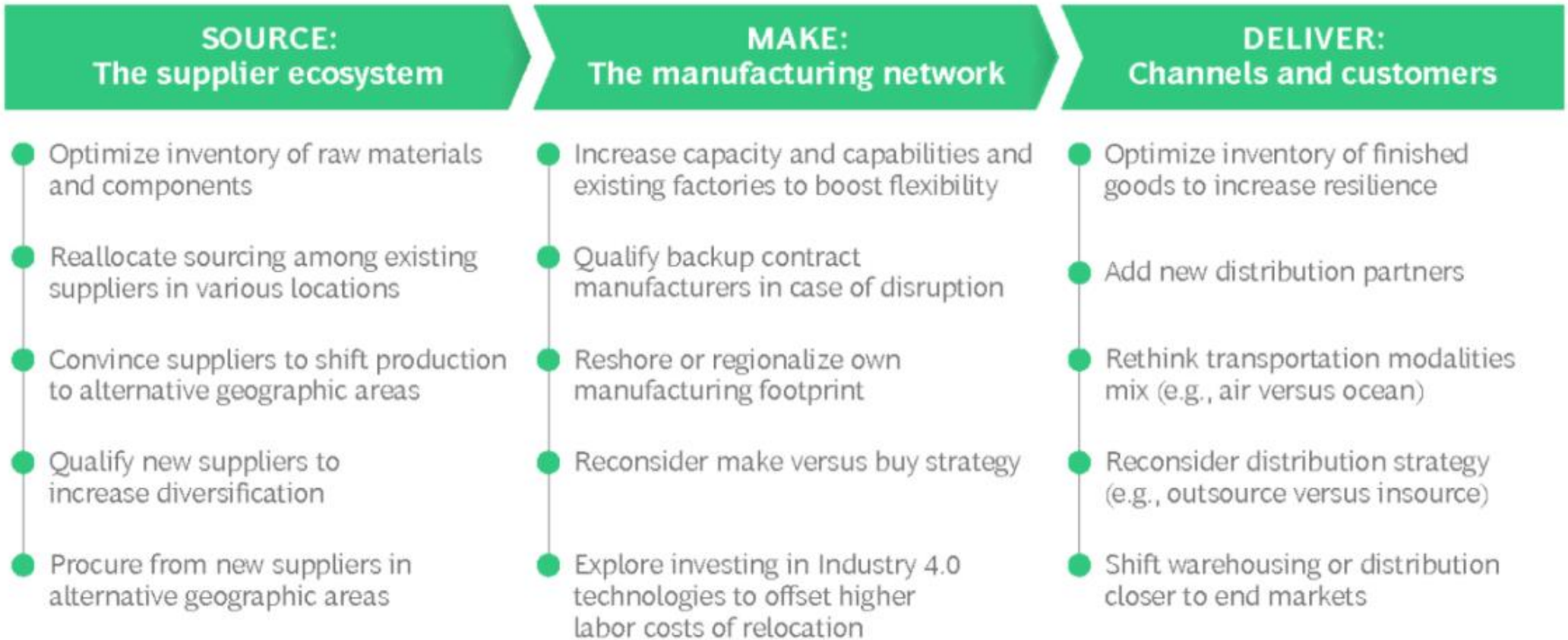
Source : https://www.bcg.com/publications/2020/resilience-in-global-supply-chains

BCG SC Resilience Model

Value Chain Dimensions	Metrics	Resilience on
Source	degree to which goods are imported, the percentage of suppliers that are concentrated in certain countries, the share of supplies that are sourced regionally and are close to end customers, the availability of backup suppliers for critical components, and the inventory levels of key inputs	supply ecosystem
Make	percentage of capacity concentrated in certain countries, the amount of production that is outsourced, and whether they have backup production capacity at existing locations in case of contingencies or qualified backup facilities in different locations	manufacturing
Deliver	share of revenues coming from markets that could be affected by sharp tariff hikes, how much of the distribution network is covered by a single partner, the average lead time for moving a product from a factory to a customer, and inventory levels in the end market	downstream channels

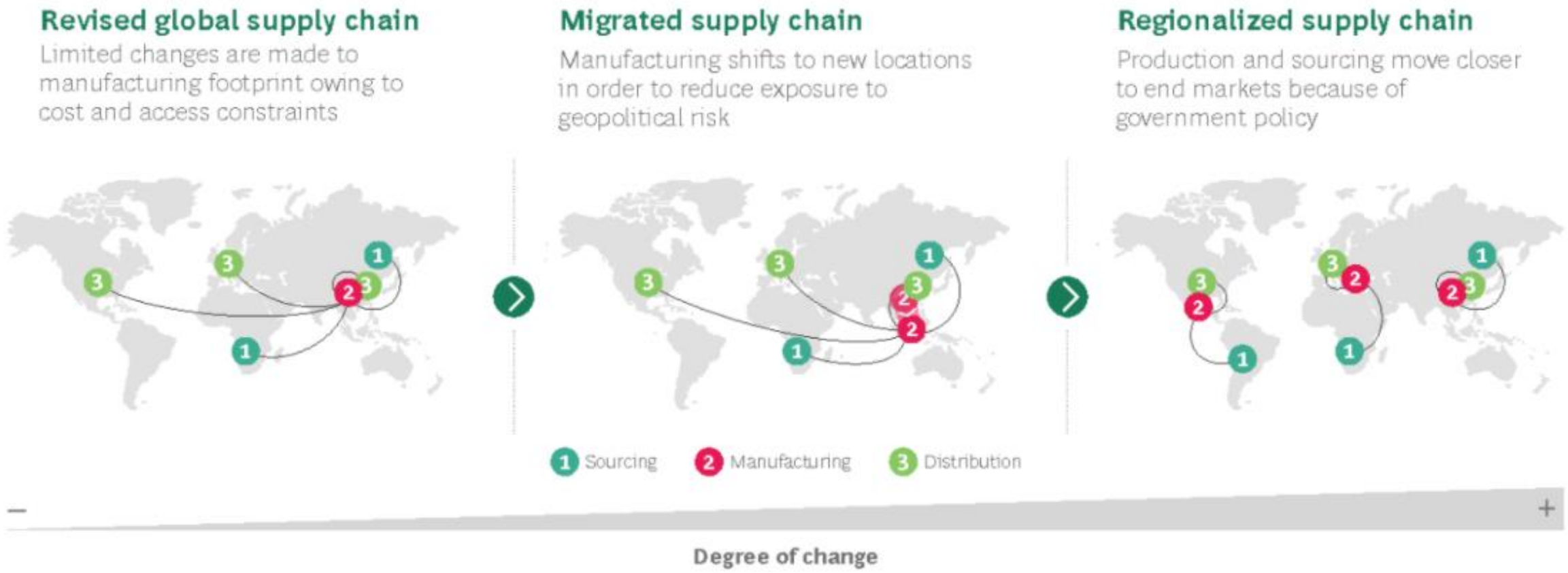
Source : https://www.bcg.com/publications/2020/resilience-in-global-supply-chains

Exhibit 2 - Levers for Improving Resilience Across the Supply Chain



Source: BCG.

ILLUSTRATIVE EXAMPLE: COMPANY THAT TRADITIONALLY MANUFACTURES IN ASIA AND SELLS GLOBALLY[1]



Source: BCG.

[1]The starting point and speed of change will vary significantly between industries.

Source : https://www.bcg.com/publications/2020/resilience-in-global-supply-chains

Revised global supply chain

A company that makes low-value motors in a highly automated plant in China may find that it needs to make only small, but strategically important, adjustments. To increase resilience, the manufacturer might **add redundant capacity and qualify parts suppliers in more locations** while also maintaining production in China in order to keep costs low and serve the Chinese market. Also take actions to improve real-time visibility into its supply chain and strengthen its risk management.

Migrated supply chain

An apparel or consumer electronics manufacturer, on the other hand, may decide the best approach is to **migrate its supply chain by shifting a portion of production** to Vietnam, India, or other countries that are not the target of high tariffs or trade uncertainty, although it would still have to weigh this against the cost, capacity, and efficiency advantages of keeping production in China.

Revised global supply chain

A biopharma company that supplies the world from Asia may conclude it needs to **regionalize its manufacturing footprint** in order to mitigate the risk of supply disruptions. Production capacity in Asia would concentrate on serving regional markets, while plants in North America and Europe would focus on demand in those regions.

Source : https://www.bcg.com/publications/2020/resilience-in-global-supply-chains

Restructuring of Supply Chain

1.Align design principles with the new reality. Begin by assessing whether your supply chain is adequate given the new economic and geopolitical realities. Identify exposure to high-level risks and the tradeoffs involved in optimizing the supply chain.

2.Segment the portfolio by supply chain risk and understand performance drivers. Define key segments within your business portfolio and assess supply chain risks based on many factors, including product, geographical footprint, technology, and exposure to potential policy change. Gauge the current performance of your supplier and manufacturing networks on dimensions such as cost and service levels.

3.Identify levers and options at the segment level. Evaluate all applicable levers for supply chain optimization according to the profile of each segment and where in the supply chain the largest risks lie. Determine the level of effort required for each action and the impact it is likely to have on supply chain capabilities.

4.Evaluate supply chain design options for each segment. For each potential lever, analyze the tradeoffs between geopolitical risk and factors such as production costs, logistics, duties, market access, and resilience. Then select an appropriate approach to supply chain optimization. Identify key KPIs for resilience: a company could, for example, decide it wants at least 30% of key products or inputs to come from three or more qualified manufacturing sites in different geographic areas and would like to keep its capacity utilization under 85%.

5.Pressure test design choices across the company. Aggregate contemplated changes at the segment level and evaluate the resulting internal and external network at a company level. Then analyze what would happen to the redesigned supply chain under a set of scenarios—such as an escalating US-China trade war, a financial crisis that bankrupts key suppliers, or another pandemic—that could lead to business disruptions.

6.Put the network redesign in place and monitor performance. Draw up a plan for implementing the new supply chain design and a system for monitoring the performance of the enterprise-to-enterprise network as the macroeconomic and geopolitical environment evolves.

BCG Six Step Approach to Improve Global Supply Chain

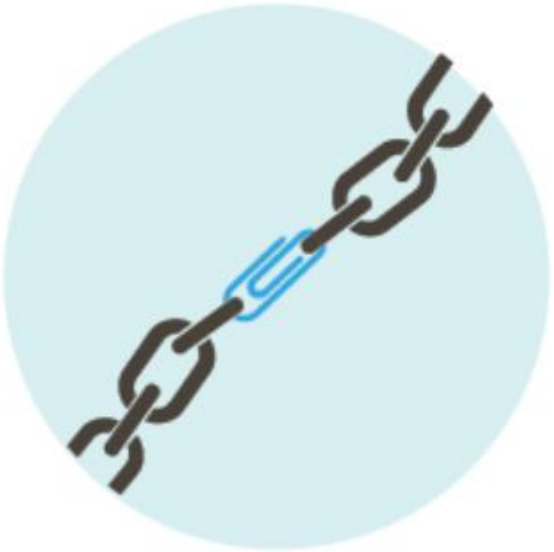
https://www.bcg.com/publications/2020/resilience-in-global-supply-chains

Resilient Workforce Management

- Long haul impact of post covid-19 on workforce
- Reduced productivity caused by health checks, potential closure when workers infected, future vaccination ruling and other safety measures
- Hybrid workforce – some WFH and some on sites - who should, when, what is the policy and procedure
- Improve virtual capability and skills of workforce
- Providing gadgets for supporting virtual workplace, training and coaching employees on its use
- Review of Human Resource policies for retaining existing workforce, hiring new workforce with digital skills, compensation and benefits scheme
- Ensuring employee health and well being, mental health issues, and health monitoring system
- Regular temperature scanning, health check updates to reduce impact of any new diseases on in-plant operations

IN SEARCH OF RESILIENCE

The pandemic has made businesses and governments more aware of the importance of resilience. But what does it really mean?



Key characteristics of a resilient supply chain:

- Robustness: strong enough to withstand shocks and changes
- Agility: able to quickly recover from shocks
- Flexibility: able to leverage options and alternatives during normal times and during recovery
- Redundancy: able to build adequate surplus capacity

RSC – Reconfigurable Supply Network

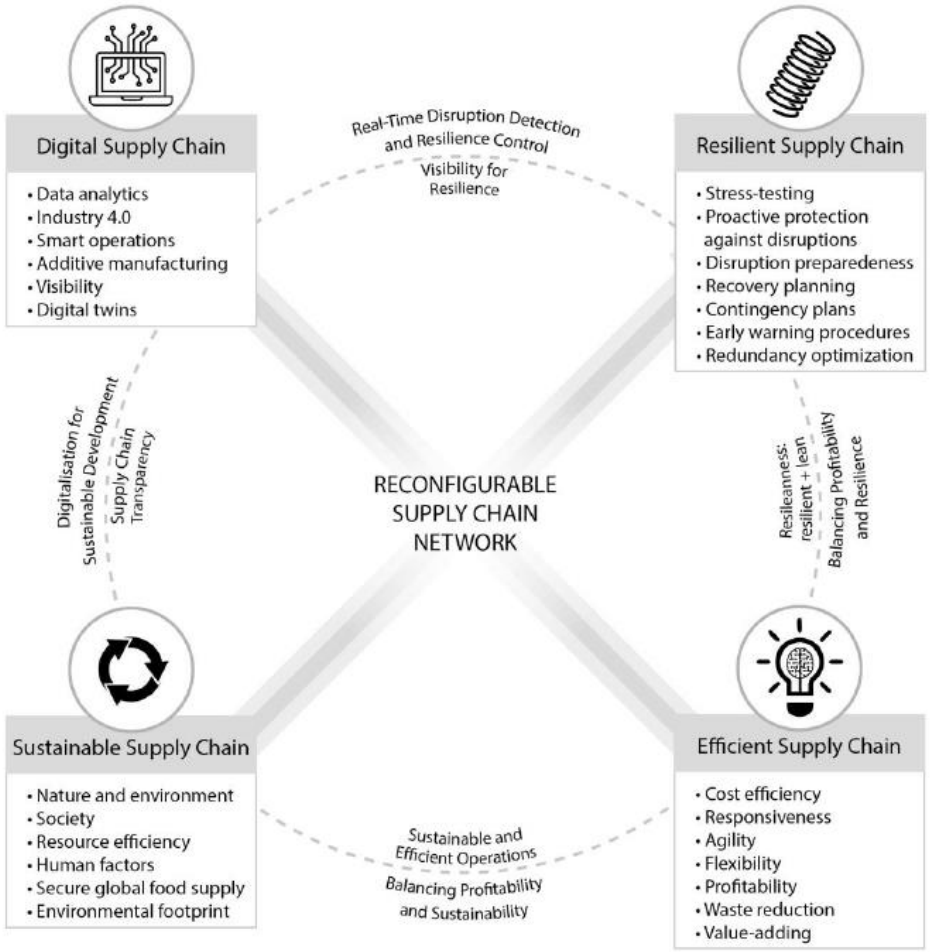


Fig. 3. The X-Network macro-framework: Design of the Reconfigurable SC

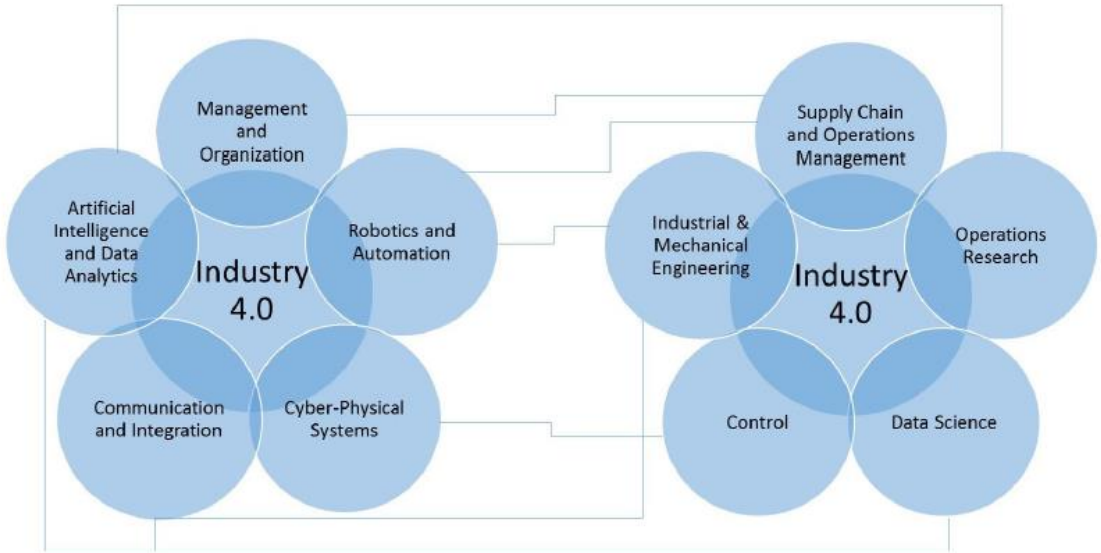


Fig. 11. Research areas and disciplines in RSC

Digitalization	Leagility	Resilience	Sustainability
information technology; innovation; integration; performance; supply chain integration; trust	agile; costs; lean; manufacturing; sales; transportation	decision-support system; risk assessment; risk management; SC performance; supply risk; uncertainty analysis;	circular economy; closed-loop SC; environmental protection; green SC management; humanitarian logistics; sustainable SC;

Alexandre Dolgui, Dmitry Ivanov, Boris Sokolov. Reconfigurable supply chain: the X-network. International Journal of Production Research, Taylor & Francis, 2020, 58 (13), pp.4138-4163.

Mar 1, 2021, 08:00am EST | 856 views

Flexibility: Every Corporation's Most Important Strength During The Pandemic

Roger David Forbes Councils Member
Forbes Business Council COUNCIL POST | Membership (fee-based)
Small Business

Roger David is the President/CEO of GSR Brands, the parent company of Gold Star Chili and Tom & Chee.

Flexibility is the willingness to change or compromise. As the cliché goes, where there's a will, there's always a way — and being flexible in how we do business and manage employees is the greatest tool at our disposal to achieve it.

https://www.forbes.com/sites/forbesbusinesscouncil/2021/03/01/flexibility-every-corporations-most-important-strength-during-the-pandemic/?sh=12f4f86d734f

Conclusions

Current Global Operations Management, Supply Chain and Manufacturing networks are fast becoming outdated – MUST transform

To thrive and win in the post-COVID-19 global economy and beyond require building supply chains that are **resilient to disruption** and **flexible** enough to capture new sources of competitive advantage through **digitalization**

Process innovations and **re-configurable** for producing ‘essential products’ during disruptions, ex. medical consumables from garment factory, industrial machines to pandemic related robots.