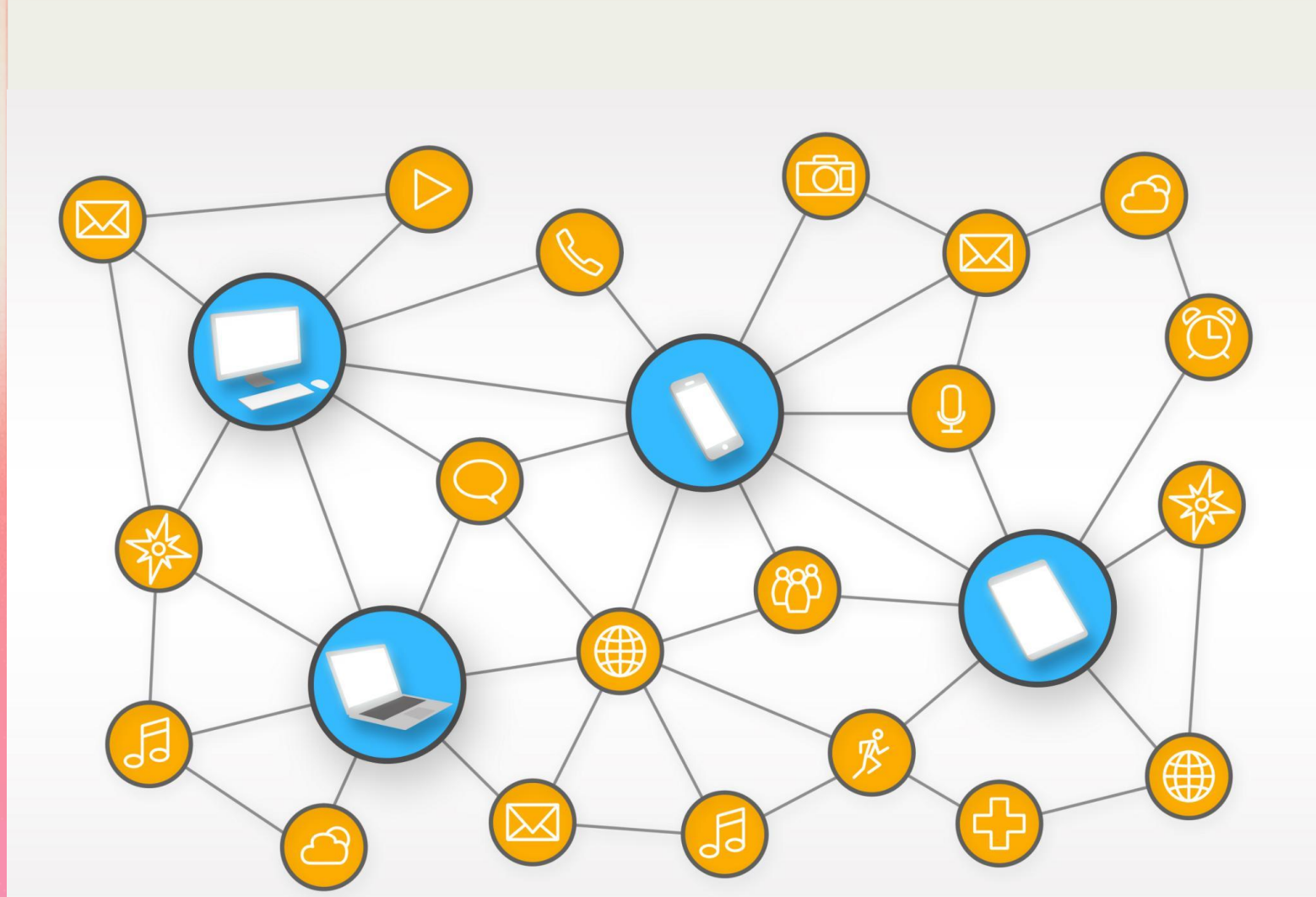
Managing Risk in Supply Chains: Frameworks, Strategies & Case Studies



Approaches to identify and mitigate supply chain risks

Introduction to Supply Chain Risk

Understanding Supply Chain Risk and Its Impact

Definition of Supply Chain Risk

Supply chain risk involves potential disruptions affecting goods, services, and information flow across networks.

Impact of Low-Probability High-Impact Events

Rare but severe events like natural disasters can cause catastrophic operational and financial damage.

Operational Resilience and Risk Management

Building resilience requires vulnerability identification, scenario planning, and contingency strategies.

Strategic Risk Mitigation Decisions

Strategic choices like supplier consolidation and production relocation influence overall risk exposure.

Sources of Risk in Supply Chains

Understanding the supply chain risk profile

1 *Supply risk*
How vulnerable is the business to disruptions in supply? Risk may be higher due to global sourcing, reliance on key suppliers, poor supply management, etc.

2 *Demand risk*
How volatile is demand? Does the 'bullwhip' effect cause demand amplification? Are there parallel interactions where the demand for another product affects the demand for ours?

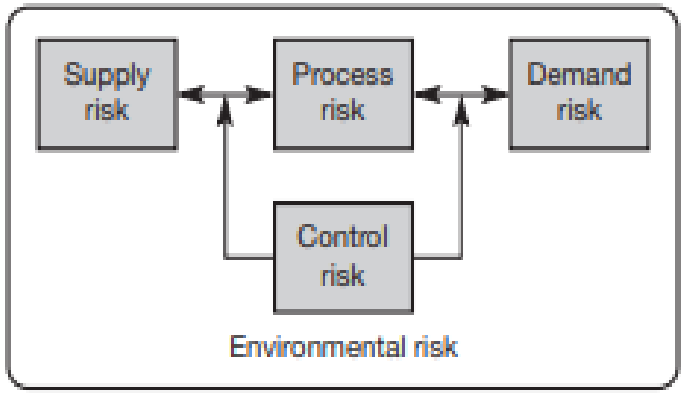
3 *Process risk*
How resilient are our processes? Do we understand the sources of variability in those processe, e.g. manufacturing? Where are the bottlenecks? How much additional capacity is available if required?

4 *Control risk*
How likely are disturbances and distortions to be caused by our own internal control systems? For example, order quantities, batch sizes and safety stock policies can distort real demand. Our own decision rules and policies can cause 'chaos' type effects.

5 *Environmental risk*
Where across the supply chain as a whole are we vulnerable to external forces? Whilst the type and timings of extreme external events may not be forecastable, their impact needs to be assessed.

Supply chain risk = Probability of disruption × Impact

Figure 10.2 Sources of risk in the supply chain



Source: Adapted from Mason-Jones, R. and Towill, D.R., 'Shrinking the supply chain uncertainty cycle', *Control*, September 1998, pp. 17–22

Five Key Sources of Risk

RISK SOURCE	DESCRIPTION	EXAMPLE
Supply Risk	Dependence on key suppliers, global sourcing	Single-source component from overseas
Demand Risk	Volatility, bullwhip effect	Sudden surge in seasonal product demand
Process Risk	Bottlenecks, variability	Limited capacity in critical assembly line
Control Risk	Distortions from internal policies	Batch ordering inflates perceived demand
Environmental Risk	External shocks	Earthquake disrupting transport routes

Risk Assessment and Numerical Examples

Developing a Risk Profile and Using FMEA

EXAMPLE	CALCULATION	RESULT
Risk Exposure	Probability 0.2 × Impact $5M	$1M
FMEA Case 1	S=4, O=3, D=4	RPN=48
FMEA Case 2	S=5, O=2, D=5	RPN=50
Safety Stock Impact	Lead time ↑ from 10 to 25 days; σ=200/day	+3,000 units

Risk Mitigation Strategies

Redundancy vs Flexibility

Redundancy Buffers

Redundancy creates buffers like excess inventory and backup systems to mitigate risk but may increase costs and reduce competitiveness.

Flexibility Advantages

Flexibility improves agility and responsiveness through adaptable product design, lead-time reduction, and cross-trained employees.

Technology and Planning Tools

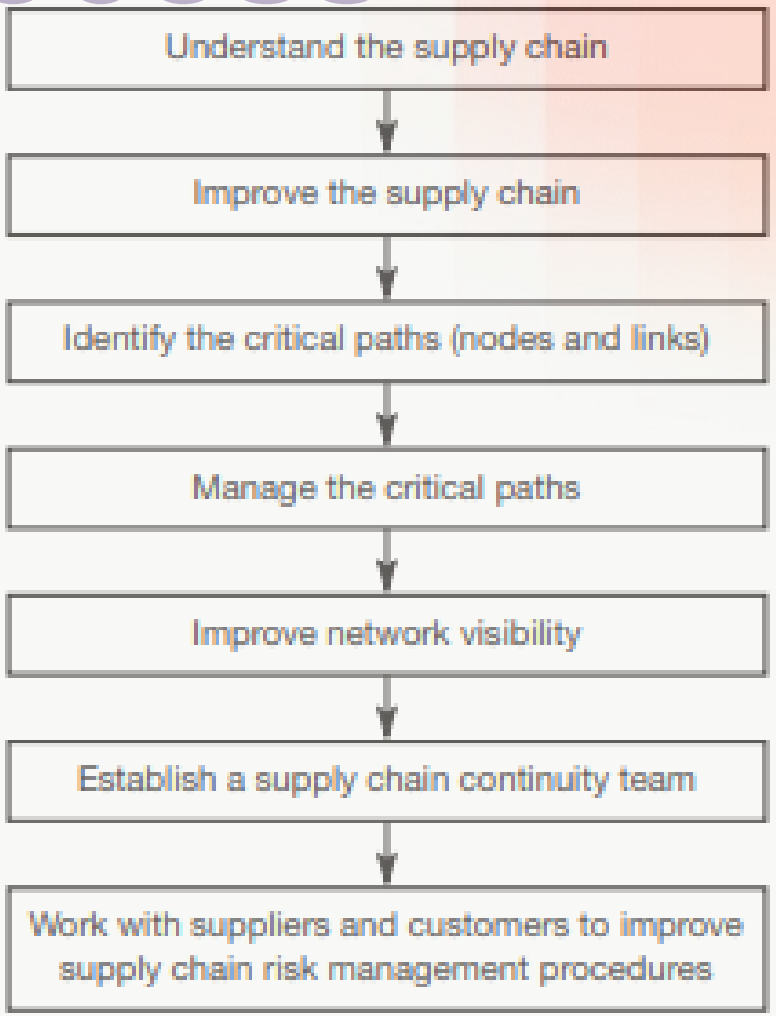
Dynamic inventory planning and supply chain visibility tools like RFID and SCEM enhance resilience and risk response.

Cost-Benefit Evaluation

Companies must evaluate trade-offs using modeling tools to align risk strategies with risk magnitude and likelihood.

Seven-Stage Risk Management Process

Figure 10.3 The supply chain risk management process



Framework for Managing Supply Chain Risk

Supply Chain Mapping

Understand supply chain tiers beyond Tier-1 suppliers by thorough mapping of upstream and downstream partners.

Reducing Complexity

Use Six Sigma and DMAIC methodologies to reduce variability and complexity in supply chain operations.

Critical Path Identification

Identify critical nodes and links in the supply chain using Failure Mode and Effects Analysis (FMEA) to assess risk impact.

Enhancing Network Visibility

Improve supply chain visibility through technologies like RFID, satellite tracking, and supply chain event management.

Building Supply Chain Resilience

Key Elements of Resilience

Agility and Flexibility

Supply chains must be agile and flexible, using slack at bottlenecks to quickly ramp operations up or down during disruptions.

Visibility and Technology

Technologies like RFID and satellite tracking provide transparency and early access to information for proactive supply chain responses.

Collaborative Intelligence

Collaboration with suppliers and customers builds trust and shared responsibility across the network for resilience.

Governance and Risk Management

Board oversight, risk registers, and strategic thinking embed resilience into organizational culture and decision-making.

Figure 10.4 Creating the resilient supply chain

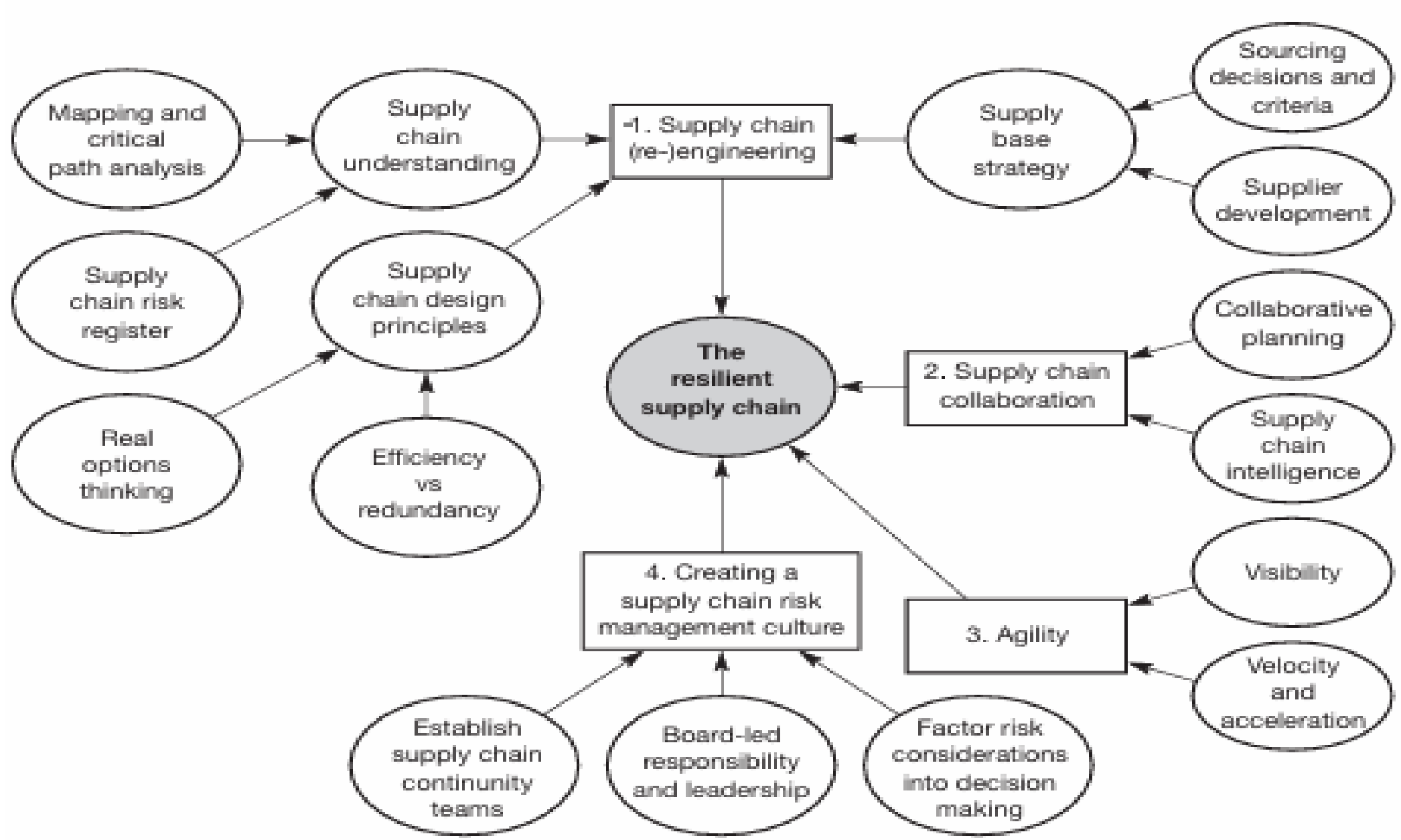


Table 10.1 Stages of excellence in supply chain risk management

Dimension	*Stage 1*	*Stage 2*	*Stage 3*	*Stage 4*
Responsibility level	• Functional or departmental skills	• Business unit	• Corporate (chief risk officer)	• Extended enterprise (board level)
Scope of risk	• Market risks (foreign exchange credit, commodity) • Property or safety risk • IT security	• Market risk • Property or safety risks • Operational risk • IT disruption • Easily quantified risks	• All enterprise risks • Business continuity • Country risk • Key business processes • Day-to-day risks	• Strategic risks • Operational resilience • Global business environment • Organisational or cultural component of risk management
Risk-mitigation tools	• Financial derivatives, property insurance	• Incident data and trend analysis • Supplier contract reviews • Self-assessment	• Contingency planning • Scenario analysis • New business and new venture audits • Risk adjusted performance measures	• Advance warning systems • Back-up of processes as well as data • Quarterly drills that include key partners
Motivation	• Follow regulations, reduce financial exposure	• Avoid operational disruptions, avoid costs of accidents	• Protect brand image, maintain earnings stability	• Create competitive advantage, generate shareholder value
Updates to risk plan	• Never	• After major incidents	• Annually	• Quarterly
Supply chain	• Buffer inventories • Excess capacity	• Alternative suppliers • Recovery plans – select scenarios	• Co-ordinated forecasts throughout supply chain • 'What if' modelling • Agility: products and processes	• Supply chain transparency • 'War gaming' • Dynamic reserves of critical components
Collaboration	• Focus Internally	• Communicate policies to suppliers	• Collaborate with suppliers, industry associations	• Lead industry initiatives, collaborate with goverment

Case Studies and Lessons Learned

Mattel, Toyota, and Nokia vs Ericsson

Mattel Recall Incident

Mattel’s $110 million recall in 2007 exposed risks from second-tier suppliers and the need for deeper supplier visibility.

Toyota Global Recalls

Toyota’s 2009–2010 recalls revealed risks from supplier over-reliance and highlighted balancing lean manufacturing with risk control.

Nokia and Ericsson Disruptions

Nokia’s swift event management enabled rapid recovery from a semiconductor factory fire, unlike Ericsson’s delayed response causing major losses.

Lessons on Risk Management

Proactive risk mapping, collaboration, and visibility tools are critical for building resilient supply chains and avoiding costly disruptions.

Conclusion and Actionable Steps

Key Takeaways for Implementation

Cross-functional Teams & Risk Register

Establish diverse continuity teams and maintain an active risk register to manage supply chain risks effectively.

Scenario Drills & Monitoring

Conduct quarterly scenario drills with partners and instrument critical paths with monitoring tools for better preparedness.

Integrated Risk in Decisions

Incorporate risk considerations into sourcing and design decisions to reduce vulnerabilities early in the process.

Collaborative Planning & Technology

Collaborate with suppliers and customers using technology for visibility and agility to respond swiftly to disruptions.