



Risks in Global Supply Chains – Examples and Management Approaches

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Risks in Global Supply Chains – Examples and Management Approaches

4th Supply Chain Management Symposium
Dr. Josef Oehmen



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Center for Clean Water & Energy at MIT and KFUPM



- Multi-year Collaboration between MIT and KFUPM
- Research in the areas of
 - Clean Water Technologies: desalination, distribution networks, developing world systems
 - Clean Energy Technologies: solar, carbon capture, high sulfur fuel turbines
 - Design Methodologies: technology readiness, innovation, entrepreneurship, risk management
- Educational programs:
 - Development of new courses, undergraduate design curriculum, and entrepreneurship at KFUPM; new graduate subjects at MIT.
- Website: ccwce.mit.edu



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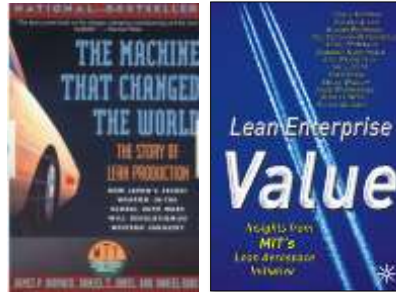
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Lean Advancement Initiative at MIT

- “Daughter Initiative” of MIT’s International Motor Vehicle Program
- Past focus on Aerospace & Defense Industry
- Today: Enterprise Transformation in large public-private partnerships
 - Management of Defense Acquisition Programs
 - Management of Healthcare Systems
- Website: lean.mit.edu



Nightingale & Srinivasan 2011:
**Beyond the Lean Revolution:
 Achieving Successful and Sustainable
 Enterprise Transformation**
 (AMACOM Press)



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Risk Management was important 500 years ago...

“Prudent princes [should] regard not only present troubles, but also future ones, for which they must prepare with every energy, because, when foreseen, it is easy to remedy them.”

- Niccolò Machiavelli
 The Prince (1513)



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Overview

- Examples of Supply Chain Risks
- Types of Mitigation Actions
- Supply Chain Risk Management Process
- Results of a Risk Management Survey

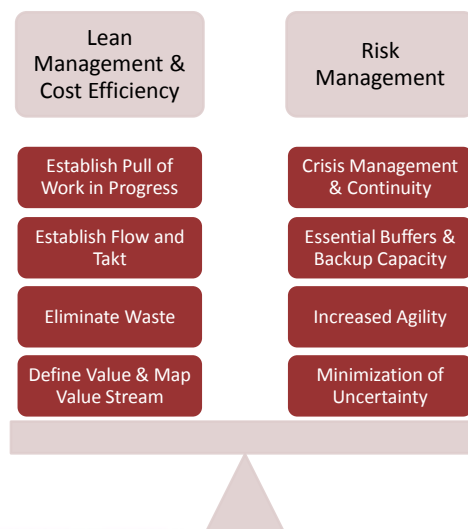


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The Case for Supply Chain Risk Management: Balancing “Lean” for Long-Term Success



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Example 1 of a Lean Supply Chain: The UK Food Industry

- Several national disaster scenarios
 - Gemini: Disruption of fuel supplies
 - Long Shadow: Disruption of energy supplies
 - Winter Willow: Infectious Disease
- Critical items
 - Bottled Water
 - Bread
 - Milk
 - Infant Formula

Simple Question:
What happens in the UK Food Supply Chain in case of national disaster?



Source: Peck 2007
Massachusetts Institute of Technology

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Results of the Study: Move to Switzerland

- Who runs supermarkets when most of the staff is ill or cannot get to work?
 - The Military! Or maybe the police!
 - No. They don't have enough people (and probably other problems at the time)
- Who distributes fuel or food when people are fighting for it?
 - See above
- Who prevents people from "buffer buying" when supplies run low?
 - See above
- What happens to food that is "off", but people are hungry?
 - Surely it can still be sold or given away for free!
 - No. Your company would be closed down.
- When do truck drivers / check-out workers get vaccinated in case of a pandemic?
 - With doctors and nurses, so they can keep working!
 - No. With us and all the other normal people.
- What happens when supermarkets close and trucks are not unloaded?
 - Well, they just take it back to where it came from!
 - No. Cross-docking stations would freeze up almost immediately.
- What happens when power is down and SAP does not run anymore?
 - There surely is a paper-based workaround!
 - Sometimes (if retailer had troubles during their SAP implementation)



Source: adapted from Peck 2007
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Example 2: Delivery Risk in the Mobile Phone Industry

Philips Semi Conductor Factory, 18. March 2000, Albuquerque, New Mexico



A very small fire at a 2nd-Tier supplier causes...

NOKIA
Connecting People



PHILIPS
sense and simplicity



ERICSSON

- Immediate recognition of problem
- Close monitoring (several times a day)
- Deployment of own technicians to supplier, involvement of top management
- Immediate global sourcing activities
- Immediate re-design of components so that other production capacities can be used
- **Result: A lot of stress for the crisis management team, but business as usual in production**

- Ignoring of problem for weeks (did not want to report bad news to superiors, Philips promised to deliver again next week (every week))
- No close monitoring of the supplier
- When problem was realized, world-wide backup capacities were no longer available
- **Result: Loss of several month of mobile phone production (in 2000!), loss of \$400m, insurance payment of \$200m, and:**



Sony Ericsson

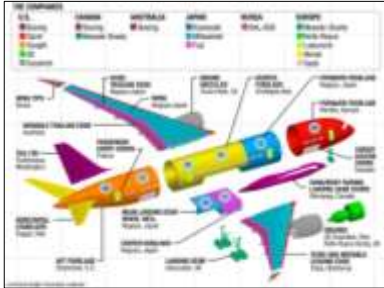


Source: Norrman & Jansson 2004, Wall Street Journal 2000
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Example 3: Schedule Risk in Innovation Drive-Supply Chains Boeing 787 Dreamliner



Complex product with a complex supply chain – management of product development across the supply chain very problematic

- 70% of components outsourced
- 50 tier-1 suppliers
- Risk sharing contract: No payment of development cost to supplier until first unit delivered to customer
- Technology risks at tier-1 suppliers (e.g. composite fuselage) undetected
- Management of development and manufacturing at tier-2 suppliers (by tier-1 suppliers) causes delays

Program Start: January 2003

Original Delivery Date: May 2008

Current Delivery Date: 1st Quarter 2011



Source: Boeing website, Tang et al 2009
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Impact of Supply Chain Risks

- Up to 30% of Supply Chain costs are risk-related
- Cases of bankruptcy and near-bankruptcy
- 10-11% loss of share price after major Supply Chain disruption
- 100s of millions of dollar disruption cost
- Loss of customers due to quality and availability issues
- Legal and reputational consequences from bribes, fraud, or violation of work / safety / social standards
 - Reputational damage travels upwards in the supply chain to company with the strongest brand or proximity to customer
 - Liability of the company: penalty payments
 - Personal liability: penalty payments, prison



Source: Hendricks & Singhal 2003, 2005a, 2005b; Norman & Jansson 2004



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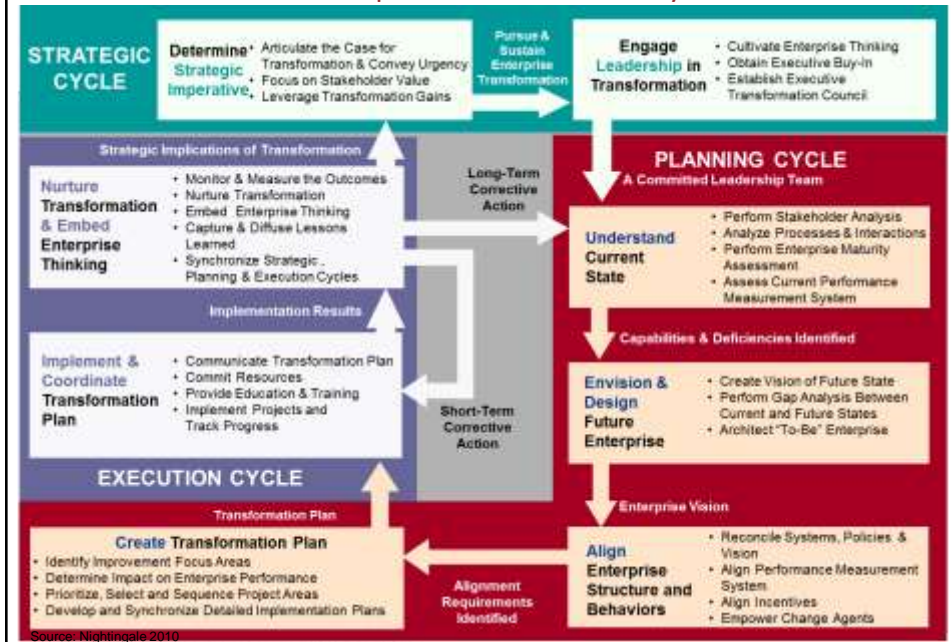
What can be done: Risk Mitigation Actions		
<p>(1. Lean Management & Efficiency)</p> <ul style="list-style-type: none"> • Reduce Waste • Define Value & Map Value Stream • Establish Flow and Takt • Establish Pull <p>✓ UK Food, Nokia, Ericsson, Philips, Boeing</p>	<p>2. Reduce internal uncertainty</p> <ul style="list-style-type: none"> • Planning accuracy • Process stability & execution • Communication & integration <p>✓ UK Food, Nokia, Ericsson, Boeing</p>	<p>3. Reduce external uncertainty</p> <ul style="list-style-type: none"> • Political & Social • Nature • Crime & sabotage • Technology <p> UK Food, Nokia, Ericsson, Philips, Boeing</p>
<p>4. Increase speed and agility</p> <ul style="list-style-type: none"> • Communication & integration • Process design emphasizing agility <p>✓ Nokia  UK Food, Ericsson, Boeing</p>	<p>5. Create essential buffers</p> <ul style="list-style-type: none"> • Capacity buffer • Material buffer • Time buffer • Cost / liquidity buffer <p>✓ (Boeing)  UK Food, Nokia, Ericsson</p>	<p>6. Business continuity planning</p> <ul style="list-style-type: none"> • Insurance • Detection • Crisis Management • Recovery <p>✓ Nokia, (Boeing, Ericsson)  UK Food, Ericsson</p>

Example: Reduction of Internal Uncertainty

- Logistics:
 - Optimization of inventory management, forecasting and risk pooling
 - Optimization of transportation logistics: network, transportation, warehousing, distribution strategies
- Contracts:
 - Optimization of contracts: Make to stock, make to order, C-part sourcing, VMI
- IT:
 - Optimization of IT and information integration: Real-time data sharing, SC-wide key performance indicators, collaborative forecasting, minimizing the bullwhip effect
- Supply Chain Coordination:
 - Integration of the supply chain: Push/pull break, lead time optimization and JIT, strategic alliances, 3PL
 - Production strategies: Make-or-buy, insourcing and outsourcing, local vs. global sourcing

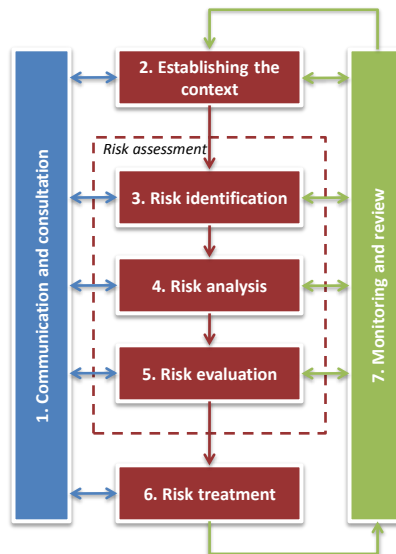


Example: Increase Agility – LAI Enterprise Transformation Cycle



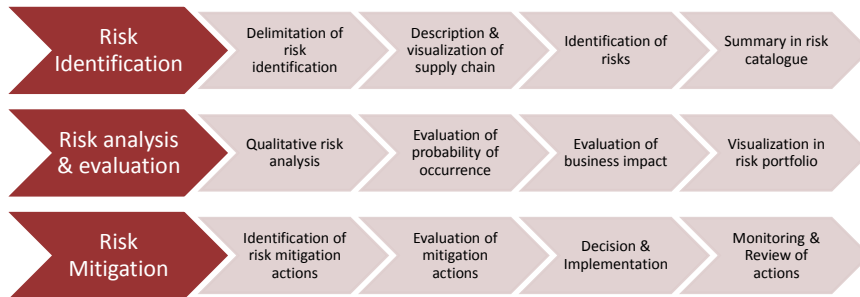
Context: Enterprise Risk Management and the ISO 31000

- A generic risk management process framework is defined by the new ISO 31000 standard
- It consists of three main parts:
 - I. The „classic“ risk management processes
 - II. The „integration loop“ with risk management processes in other departments (or on other levels)
 - III. A monitoring and review loop



Source: ISO 31000 Standard (2009)

Supply Chain Risk Management Process



Source: Ziegenbein 2007, Oehmen 2010



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Supply Chain Risk Assessment in 1 Minute

– Please count the number of “yes” answers –

- Do you know who your critical suppliers are and how much their failure would impact your company's profits?
- Have you fully mapped your critical supply chains upstream to the raw material level and downstream to the customer level?
- Have you integrated risk management processes into your supply chain management approaches?
- Do you have routine timely systems for measuring the financial stability of critical suppliers?
- Do you understand your tier 1 production facilities and logistic hub exposures to natural catastrophes?
- Is supply chain risk management integrated into your enterprise risk management approach?
- Do you record the details of supply chain incidents and the actions you have put in place to avoid future incidents?
- Do your tier 1 suppliers have business continuity plans that have been tested in terms of their viability?
- Have you provided risk training to your supply chain management team?
- Is risk on the agenda at performance meetings with your strategic suppliers?

Scoring Results:

8-10: You probably have a good understanding and control over the risks you face

5-7: You may have a number of key gaps which could impact your reputation or profitability

3-4: How are you sleeping at night?

0-2: Good luck



Source: Wildgoose / Zurich Insurance, 2010

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Goal of Supply Chain Risk Management: Smart Resource Allocation

1. Focusing management attention where it is needed

- **Risk-driven SCM**

2. Making sound entrepreneurial choices

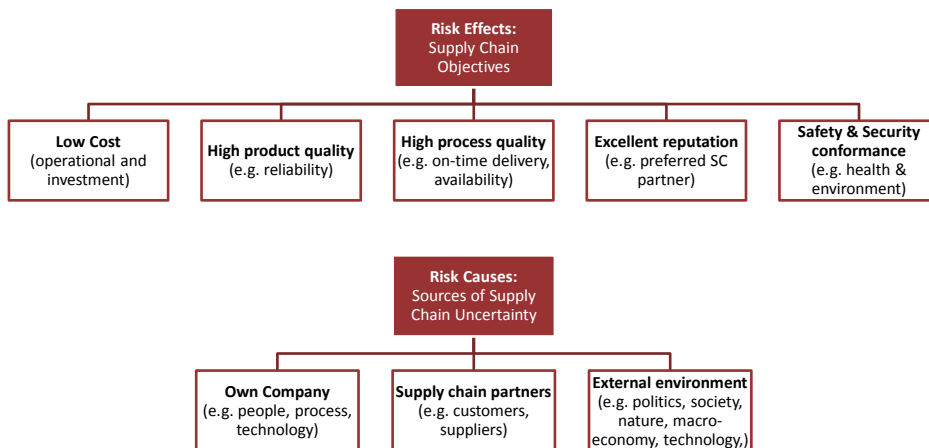
- **Optimized Risk-Return Portfolio**
- **Stability and Long-term Success**

3. Ensuring the survival of the company in rough times

- **Crisis Management and Business Continuity Planning**



Risk = Effect of Uncertainty on Objectives



MIT Survey of Supply Chain Risk Management

- Conducted by Dr. Bruce C. Arntzen
- MIT Center for Transportation & Logistics
 - Engages over 60 faculty and research staff from all 5 MIT schools
 - Works with over 50 companies across the world
 - SC2020: High-performance supply chains
 - Security, resilience and risk management in supply chains
 - Sustainable and low-carbon supply chains
 - And much, much more: ctl.mit.edu

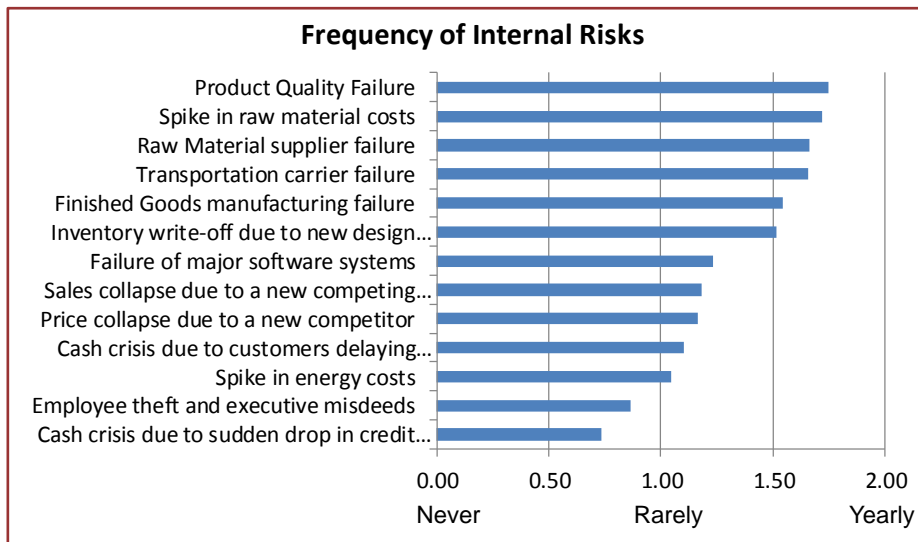


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Top Internal Risks: Product Quality, Raw Material Price and Supplier Failure



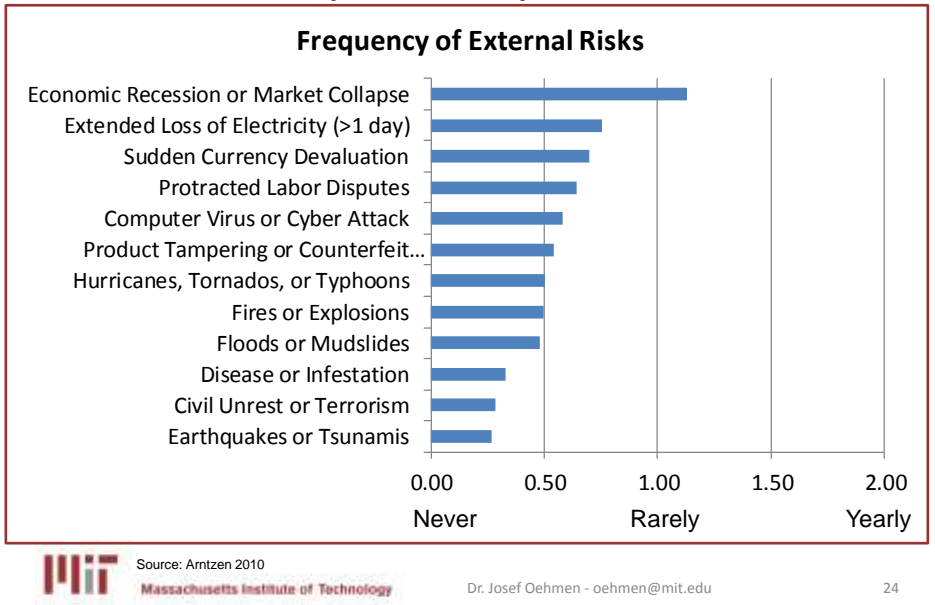
Source: Arntzen 2010

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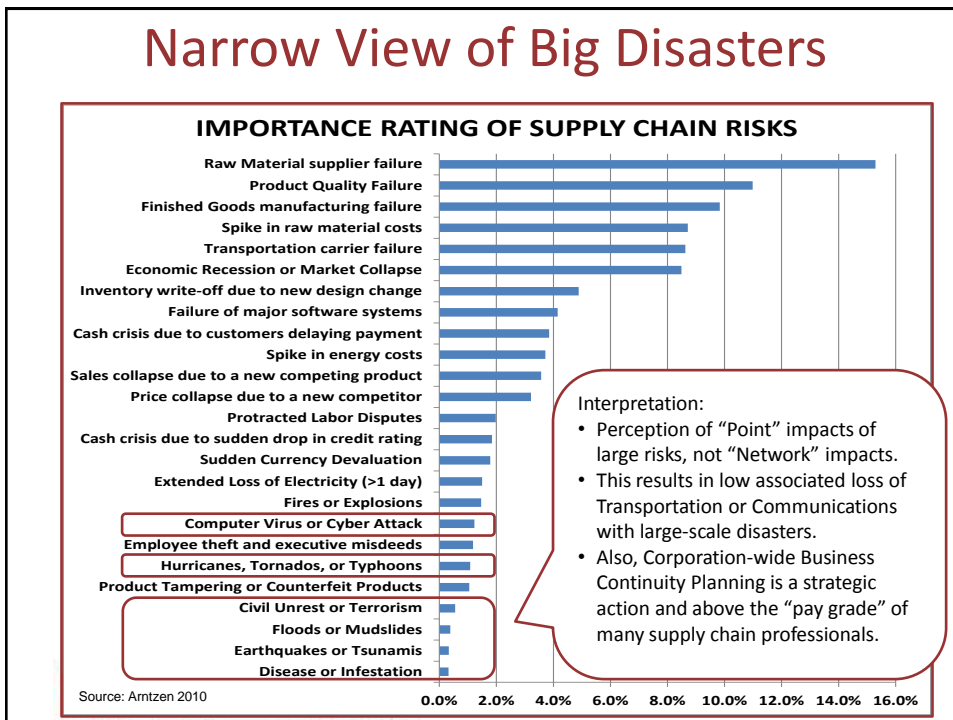
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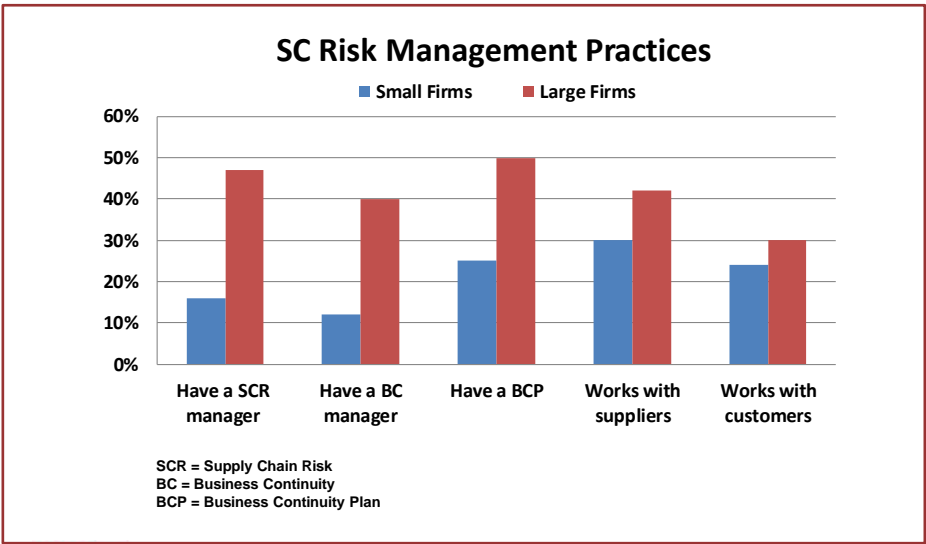
Top External Risks: Recession, loss of electricity, currency fluctuations



Narrow View of Big Disasters



Company Size has Strong Influence on Supply Chain Risk Management Practices

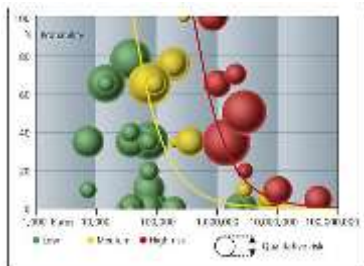


Source: Arntzen 2010
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Example: Siemens SIRA Method

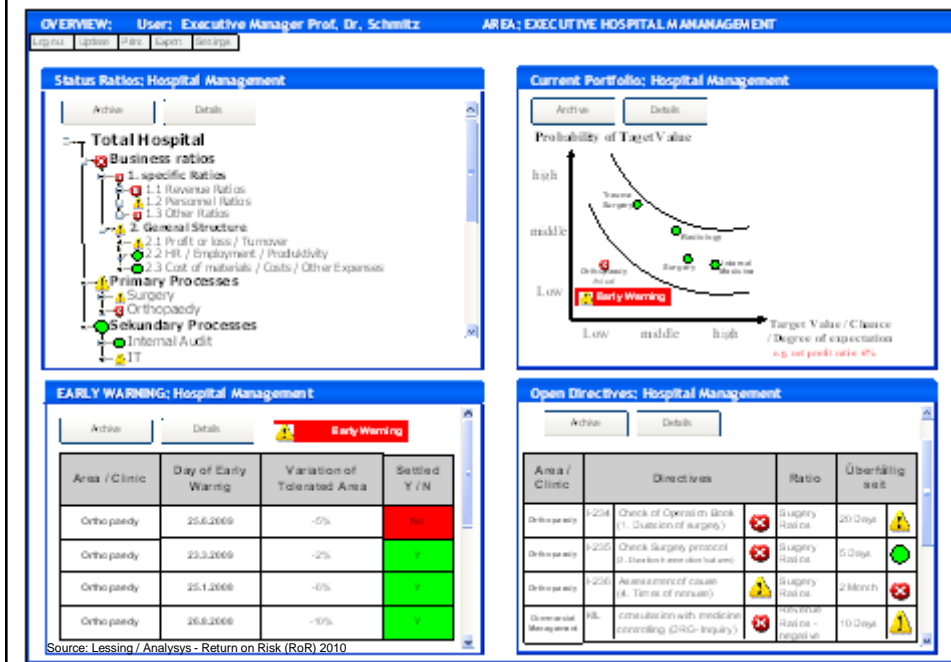


Source: www.siemens.com
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Example: Return-on-Risk (RoR) Risk Management Suite



Sneak Preview: Khan & Zsidisin (2011) + ISCRIM Handbook for Supply Chain Risk Management: Case Studies, Effective Practices and Emerging Trends

- Risks in Global Sourcing
- Strategic Collaboration & Cooperative Networks
- Performance-based Logistics
- Maritime Supply Chains
- Natural Gas & Energy Supply Chains
- IT for Risk Mitigation
- Managing Project Risks



Other books by the ISCRIM Network:

- Brindley 2004: Supply Chain Risk (Ashgate)
- Zsidisin & Ritchie 2008: Supply Chain Risk: A Handbook (Springer)

Summary

- Supply Chain Risks are real and expensive
- Risk Management = Long-term balancing of cost savings and resilience
- Supply Chain Risk Mitigation = Supply Chain Process Improvement (not only buffers)
- Supply Chain Management is more than just logistics: Value-Creation in the extended Enterprise
- Focus your attention on largest uncertainties, balancing risk and return, and business continuity planning

