A Researcher's Perspective on Supply Chain Risk

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18 June 2012

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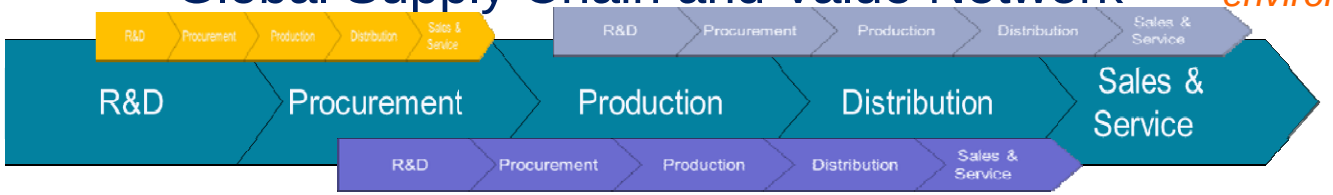
Landscape of Industrial Challenges

Adaptation to future scenarios

Managing Uncertainty

Competitiveness in global economic environment

Global Supply Chain and Value Network



Skills & Platform Technology

Use green technology and produce low waste

Availability, accessibility, financial feasibility ?

Use less resources

Materials and Resources

Restrictive Material and Substances

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The world is changing …

Original Equipment Manufacturers

…Vertical Integration Vs. **Specialisation**
…Integral Products Vs. **Modular assembly**
…Centralised Vs. **Dispersed**…

Environment is unpredictable

Black Swans occur

… political instability and **economic crises**

… customers increasingly globally aware

… **competition** for global resources, **scarcity** of materials (access/availability)

…frequency of external events- **terrorism & natural disasters**

Implications for the future

… **Value chains** are increasingly **fragmented** and **complex**

… **competition between global supply chains**

… managing **uncertainty** is a key requirement

…emergence of **new business models**

Changing technology landscape

… **disruptive technologies** spanning product groups

… alternative **production processes**

… Shorter **product life cycles**

Suppliers & Subcontractors

… Increasing **dependence on contract manufacturers** and **global suppliers**

… are **involved in product development**

… **risk** sharing

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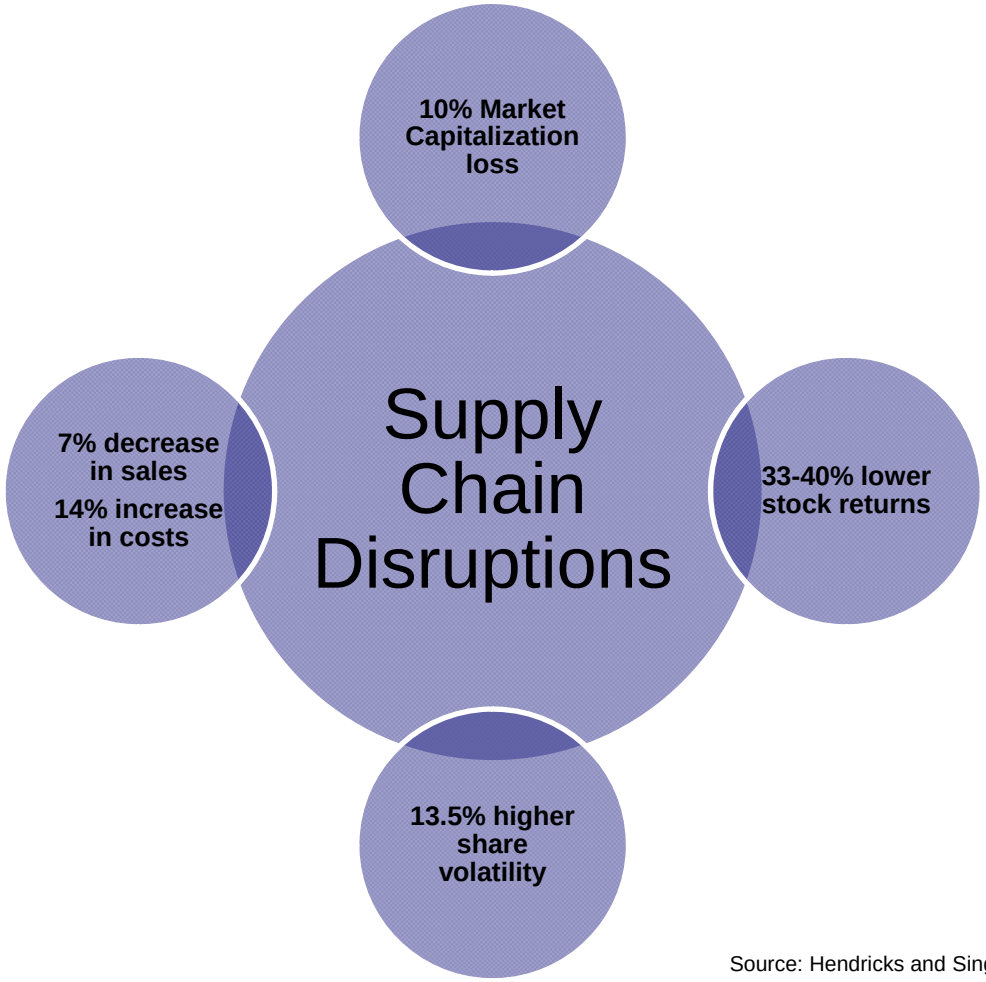
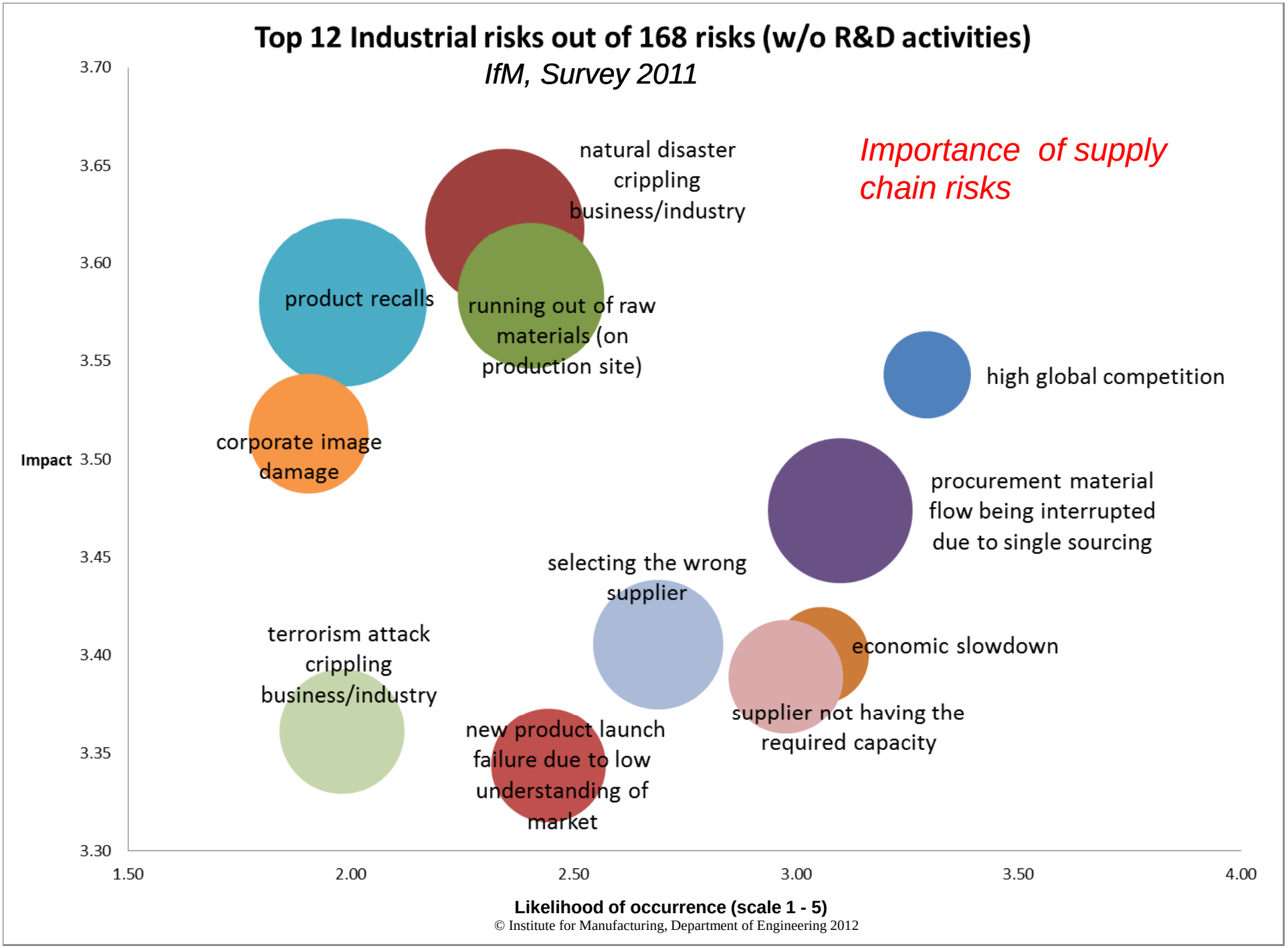
Examples of supply chain risks

Year	Company affected	Cause	Consequences
2011-2012	Western Digital, Dell	Thailand flood	a **3.8 million-unit shortfall in PC shipments** in the first quarter of 2012, due to hard disk drive shortage
2011	Honda, Toyota, GM…	Japanese tsunami and earthquake	Honda **cut production** at its UK factory by 50% for seven weeks, while three Nissan plants in the US **shut down** completely. **3.6m units lost** from global vehicle production 2011
2010	BMW and Nissan	Volcanic eruption (Iceland)	Delayed production at three BMW plants in Germany because of shortages of electrical components **affecting 7,000 vehicles**
2008	Volvo	Currency fluctuations: weak dollar	**28% reduction of sales** compared with the same period in previous years with a **50% reduction for its SUV**
2003	American companies	Grid blackout in the northeast of the USA	**Significant disruptions** in the supply chain
2002	NASA and Ford	"love Bug" computer virus	The virus shut down email at the Pentagon, NASA and Ford **causing billions of dollars** in estimated damages.
2001	Toyota & Ford	Terrorist attacks against the World Trade Centre	Automotive **Parts were blocked** at the Canadian border leading to **production stoppage**
2001	Land Rover	Supplier (UPF-Thompson) bankruptcy	The Discovery production line was **shut down for a couple of months**
2000	Nokia and Sony Ericsson	Fire in a Philips semiconductor factory	**$400 million loss** for Sony Ericsson when it became clear that the production would be compromised for months, Ericsson faced a **serious shortage of critical parts**
1999	Apple	Taiwan earthquake	DRAM **chips shortage**, since most suppliers were located around the same location and faced disruption due to the earthquake.

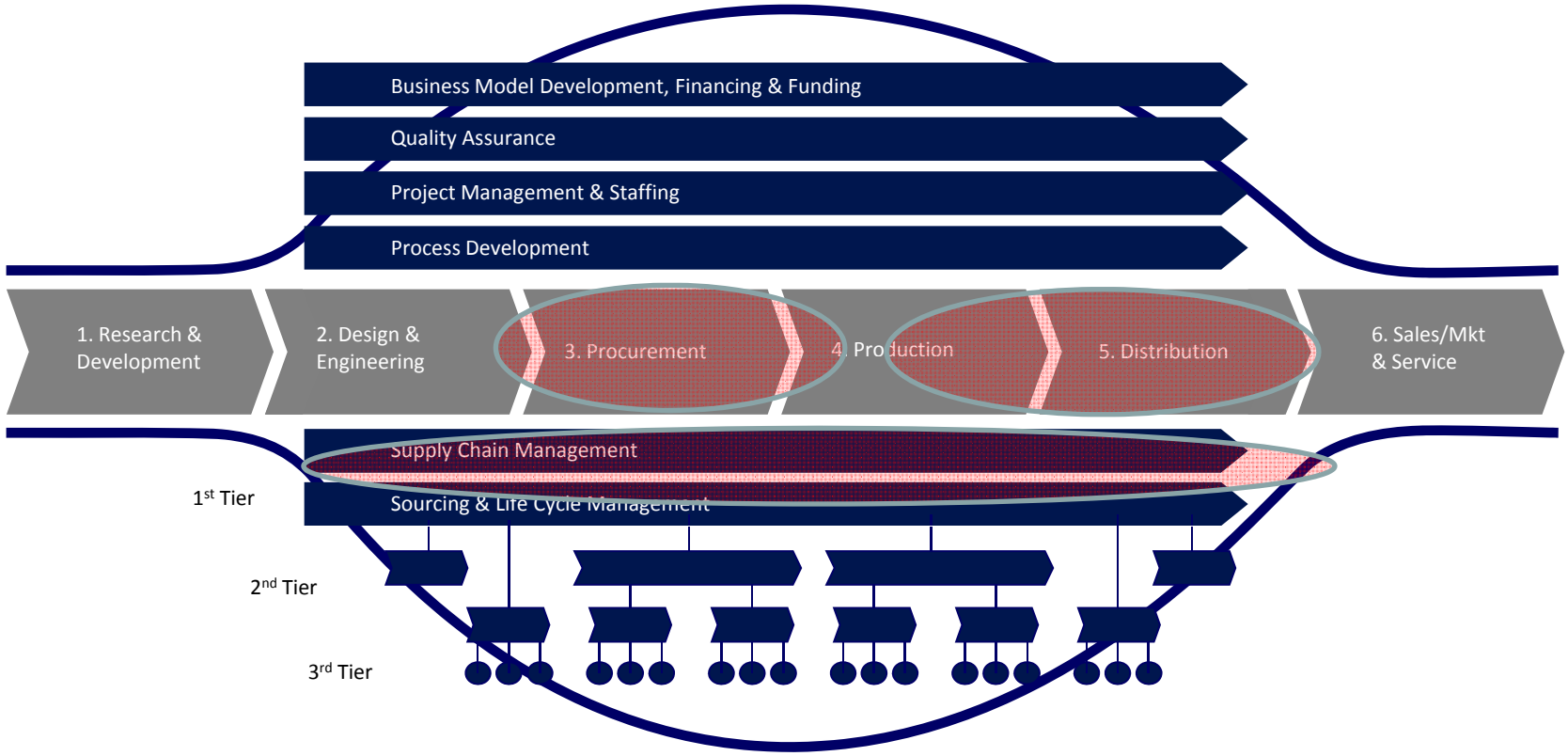
Supply Chain Risk - Potential Consequences



Source: Hendricks and Singhal 2005, Bosman 2006, Olson 2004



A Typical Supply Chain – Narrow View of Risk Exposure



Risk Management: Process Maturity

Maturity Model combines notions of evolution with levels of process formality, emphasising effectiveness and repeatability

-External and internal risks sources considered in maturity mapping

Maturity Capability	Accidental/ Initial 1	Repeatable - 2	Defined 3	Manage 4	Mastered/ Optimised 5
Risk Management	No formal risk assessments made	Internal Risks identified thru a formal process	Network Risks identified thru a formal process	Network Risks managed routinely	SC & Product/Service offering redesigned to offset key risks

Case Study: Investigation into SCN Risk Management Capabilities

Maturity Capability	Accidental/ Initial 1	Repeatable - 2	Defined 3	Manage 4	Mastered/ Optimised 5
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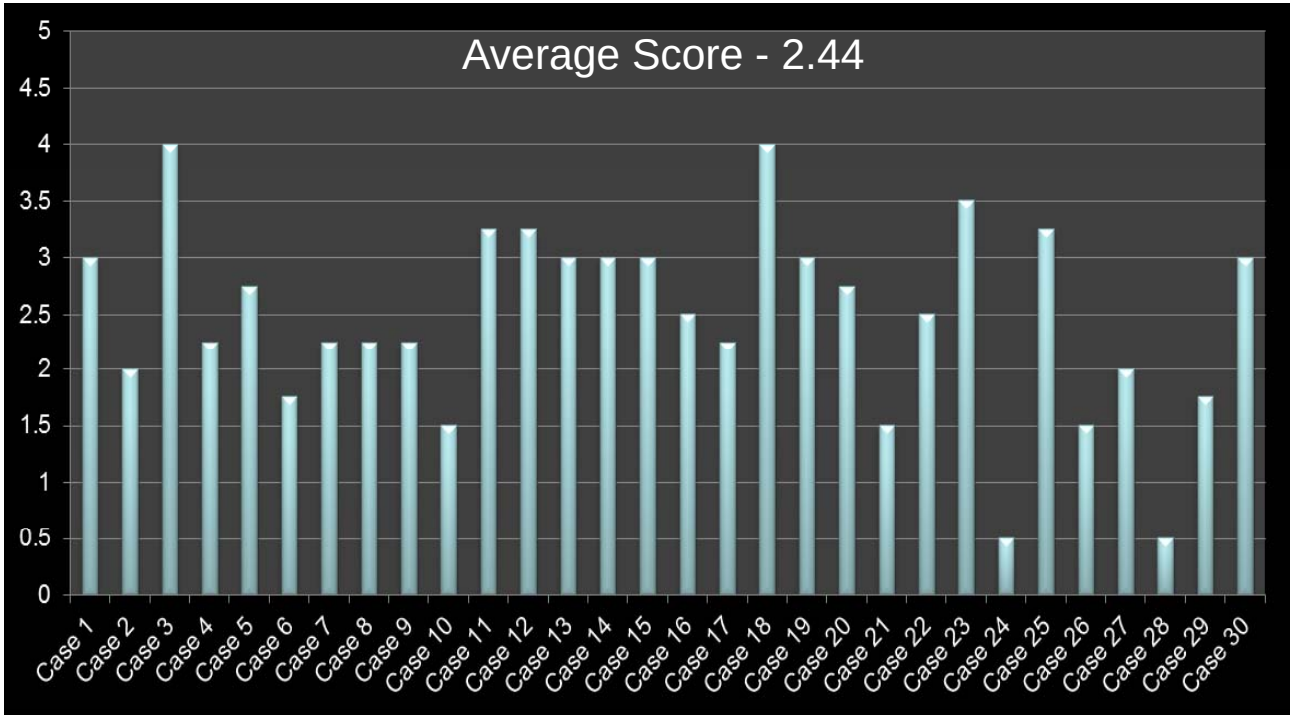

Mfg companies lack a systematic approach to identify, assess, administrate and monitor risks

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Tools for Practitioners

Industrial Investment Risk Management

- Based on PhD research
- Developed through a Industrial Partner

Supply Chain Network Risk Management

- Based on previous RM tool
- Key factors derived from Industrial Survey
- Currently in testing phase

Practical Approach

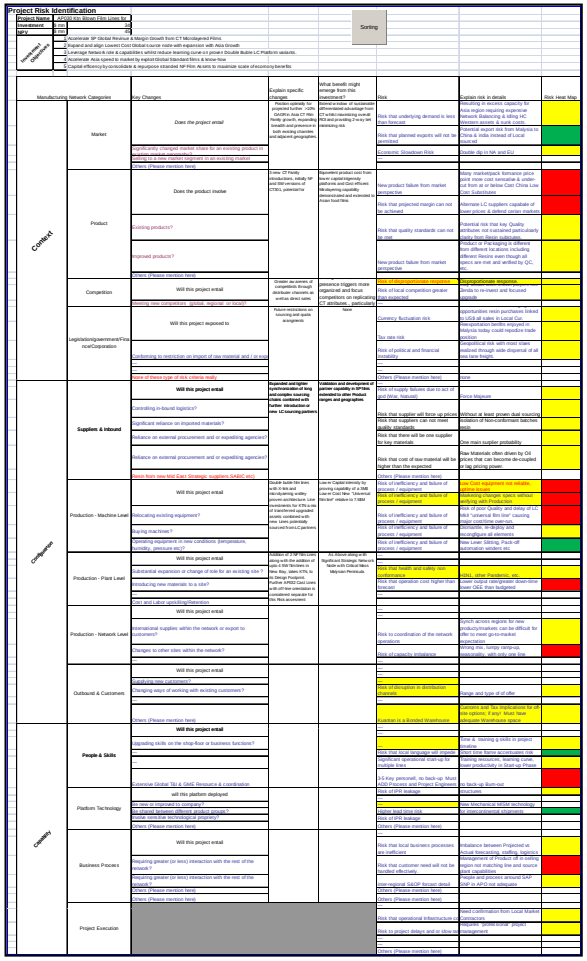
1. Identify Changes Resulting from Network
   - List of generic changes / characteristics prompts
   - Identification of specific changes/ value characteristics

2. Identify Risks Resulting from Changes / SC Characteristics
   - List of generic risks prompts
   - Identification of specific risks
   - Quantification of risk exposure
     - impact and probability

3. Identify Mitigation for More Serious Risks
   - Identification of specific mitigation (may include additional projects) in terms of
     - Resources, timing, costs and impact on return
   - List of generic mitigation types

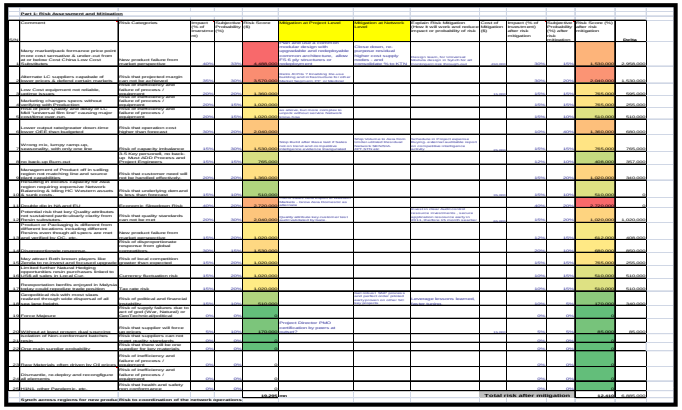
Investment risk: implemented by leading multinational

- Risk identification
- Risk assessment



More Serious Risks

- Risk mitigation



- Ownership & Accountability

Conclusions	
Summary of key risks	Description
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total risk score	3022%
Total risk score after mitigation	1512%

Action Plan	What	Who	When	Linkages with other projects
1	Action 1			
2	Action 2			
3	Action 3			
4	Action 4			
5	Action 5			
6	Action 6			
7	Action 7			
8	Action 8			
9	Action 9			
10	Action 10			

- Monitoring

Context	Project 1	Project 2	Project 3	Project 4
Market	0%	0%	0%	0%
Product	0%	0%	0%	0%
Competition	0%	0%	0%	0%
Legislation/government/Finance/Corporation	0%	0%	0%	0%
Configuration				
Suppliers & Inbound	0%	0%	0%	0%
Production - machine level	0%	0%	0%	0%
Production - plant level	0%	0%	0%	0%
Production - network level	0%	0%	0%	0%
Outbound & customers	0%	0%	0%	0%
Capability				
People & skills	0%	0%	0%	0%
Platform technology	0%	0%	0%	0%
Business process	0%	0%	0%	0%
Project management	0%	0%	0%	0%

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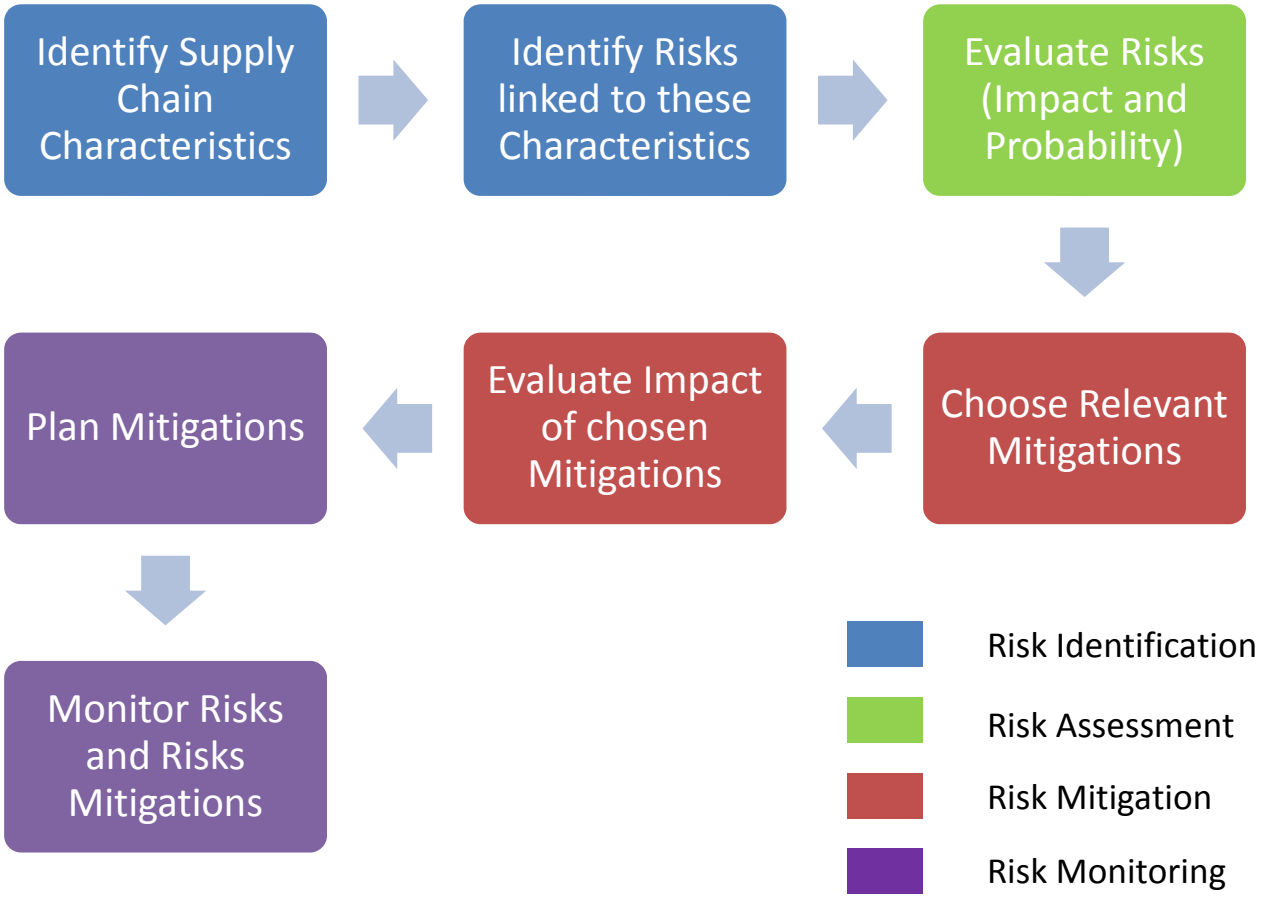
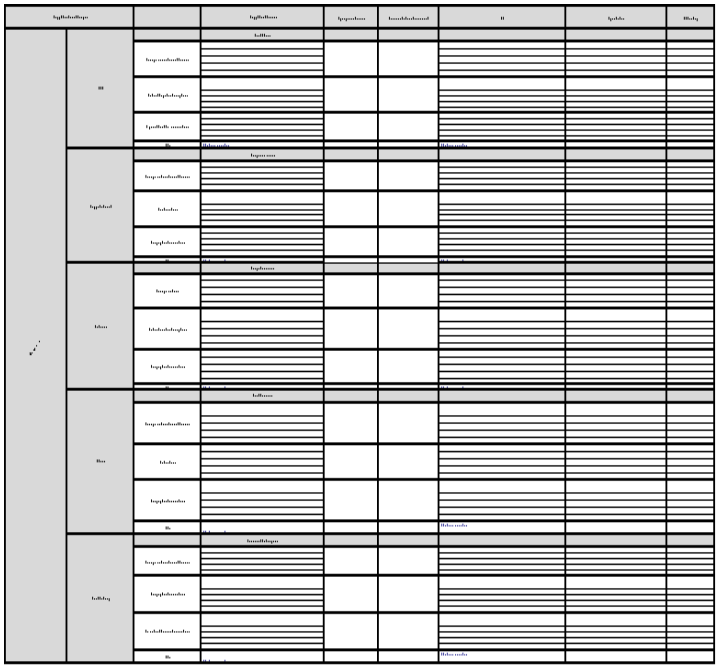
A Supply Chain Risk Management Framework



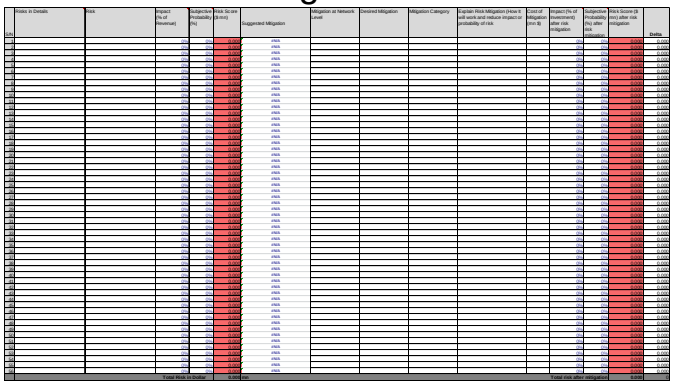
Supply Chain Focus: testing with leading multinationals

- Risk identification
- Risk assessment



More Serious Risks

- Risk mitigation

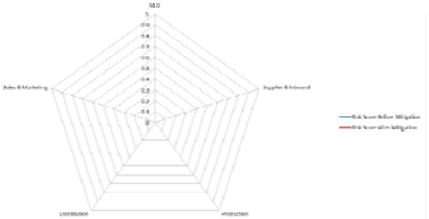


- Ownership & Accountability

Summary of key risks	Description	Action Plan/Mitigation Chosen	Mitigation Category	Mitigation Details	Who	When	Linkages with other projects
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
Total risk score (mn $)		0.00					
Total risk score after mitigation (mn$)		0.00					

- Monitoring

Risk Section	Risk Subsection	Worshop 1		Worshop 2		Worshop 3		Worshop 4		Worshop 5		Worshop 6		Worshop 7	
		Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation
R&D															
	Management level														
	Product & Design Technology Level														
	Employe skills and communication level														
	TOTAL	0	0												
Supplier & Inbound															
	Supplier behaviour and relationship level														
	Raw material level														
	geographical location level														
	TOTAL	0	0												
Production															
	Management level														
	Product/process/technology level														
	production location level														
	TOTAL	0	0												
Distribution															
	Distribution Management Level														
	Product level														
	Geographical location level														
	TOTAL	0	0												
Sales & Marketing															
	Management Level														
	Geographical location level														
	Demand and Financial projection level														
	TOTAL	0	0												
TOTAL															
	TOTAL RISK	0	0												



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Where Next….

- **Understanding risk from global industrial systems perspective**
- **Linking strategic, operational and technical risks to financial implications**
- **Blending qualitative & quantitative approaches**
- **Developing & tailoring tools for key risk categories**
- **Current focus on supply chain risk management and resilience**

Thank you

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