Risk Intelligent Supply Chains

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In physics the truth is rarely perfectly clear, and that is certainly universally the case in human affairs. Hence, what is not surrounded by uncertainty cannot be the truth.
--Richard P. Feynman[i]

He who is afraid of the sparrow does not sow millet.
--Turkish Proverb

Today's world is more uncertain, fragile, complex, and entangled than ever. In the historical Silk Road, where the first seeds of global supply chain networks were sown, international production, consumption, transportation, and trade took place along many disparate regions from China, India, Central Asia, Turkey, and Europe. In those ages, supply chain risks were more local, less impactful, and sporadic such as caravan robberies, death of camels on route, and bad weather. [ii] However, today, in the New and Modern Silk Road, where the speed and agility is the norm in complex ecosystems, risks in global supply chain networks become harder to assess and manage while new unknown elusive risks appear every day. In such an environment, executives need to develop their risk intelligence to anticipate and take the right risks through right perceptions.

As uncertainty and fragility increase, global supply chain networks become more complex and risks behave more interdependently. Cascading events are more frequent. Unprecedented consequences for the societies, corporations, and individuals are around the corner. Some of these events have already occurred--as seen in the Japanese Fukushima Disaster, Thailand floods, widespread product recalls, counterfeit products, and the financial crisis looming in Southern Europe. 85% of the 559 organizations surveyed by the Business Continuity Institute, for example, have experienced at least one supply chain disruption in 2011.[iii]

If one examines the cost of damages caused by global disasters, one observes a dramatic increase in the damage cost as well as the volatility in recent years.[iv] (Refer to Figure 1.) During 1960-2011, global disasters that have caused the highest cost damages were *storms* (36%), *earthquakes* (31%), and *floods* (23%). The remaining costs were due to droughts, wildfires, extreme temperatures, and industrial accidents.

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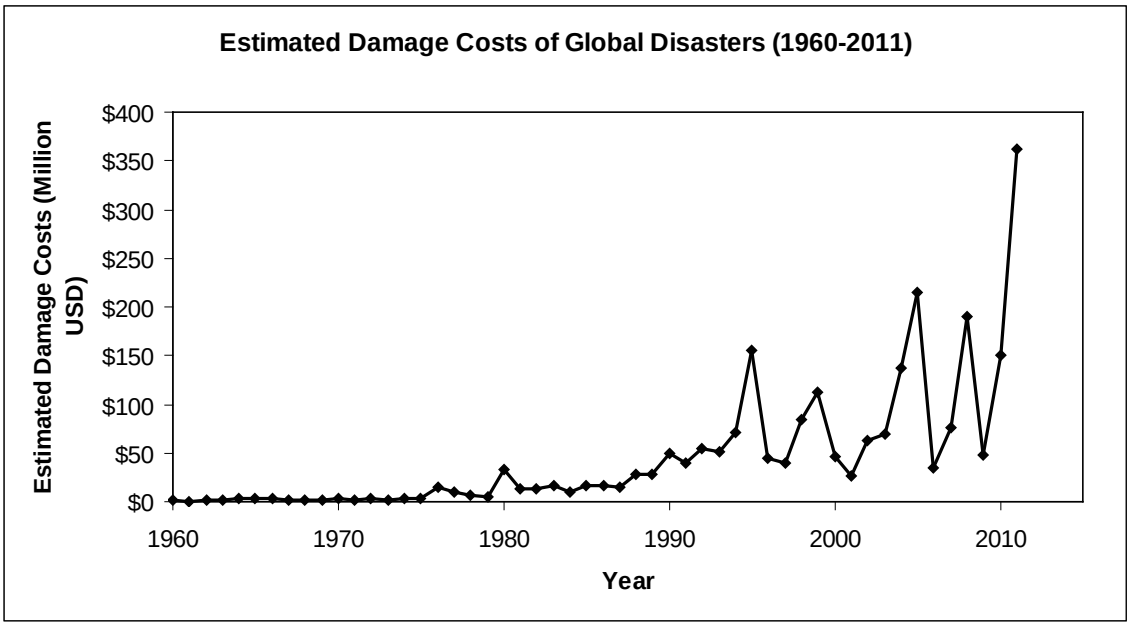

Figure 1. Estimated Damage Cost of Global Disasters (1960-2011) (Million USD) (Source: EM-DAT, The International Disaster Database)[v]

In our recent research, we answered three questions:[vi] (1) Which supply chain risks are more widespread in this time period (1999-2011)? (2) Which risks have the most impact on global supply chain operations? (3) Which industries are the most vulnerable? And to which supply chain risks?

What we have found were startling. (Refer to Figure 2.) Out of 458 risk events analyzed during 1999-2011, the highest number of supply chain disruption (242 out of 458) was due to the **manmade disruptions**[vii] with top three risks as *strike (30.1%), product recall (27.2%),* and *breach of contract (13.8%).* The next most ubiquitous risk was the **natural disasters**[viii] with 115 events having *fire (51.3%), snowstorm (19.1%),* and *flood (10.4%)* as the top three risks. Third, with 101 events**, demand-supply mismatch**[ix] was the least affecting risk in global supply chain networks. In this category, *out-of-stock (51.5), delay (20.8%), and inventory write-off (19.8*%) risks were the most prevalent.[x] Manmade disruptions affected the automotive supply chains whereas natural disasters' highest impact was felt on the energy supply chains. On the other hand, demand-supply mismatch risks dearly affected the pharmaceutical supply chains.

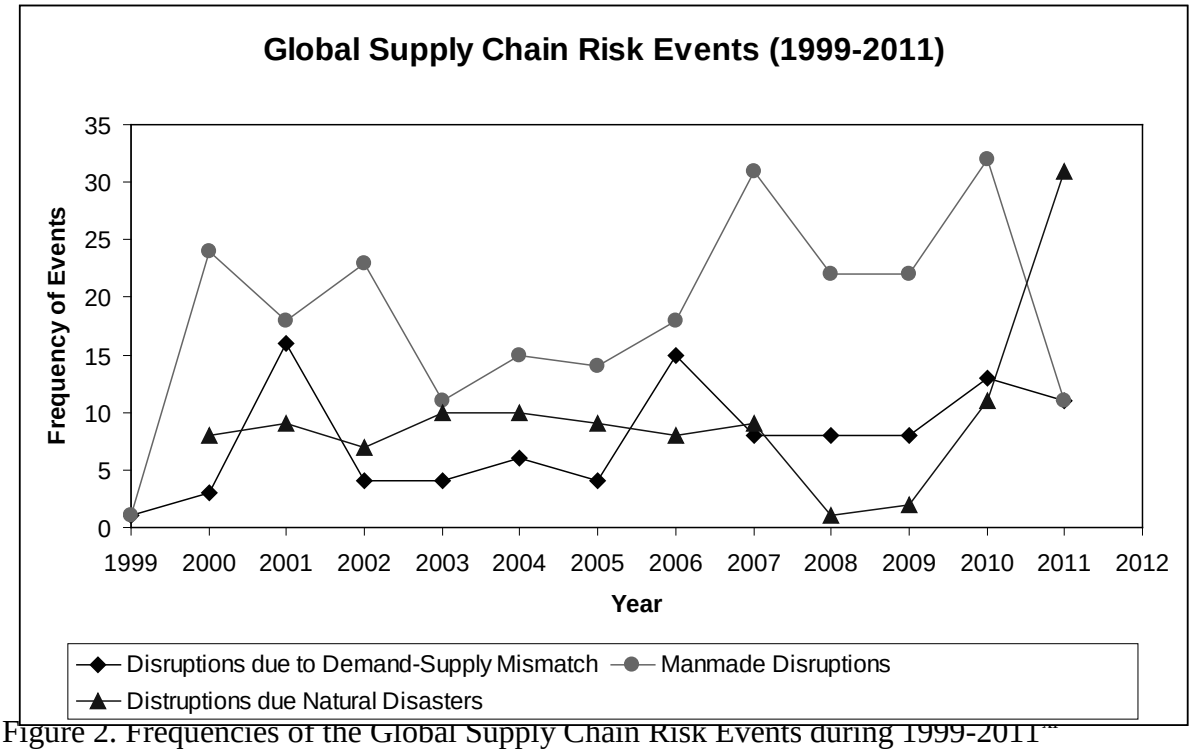

Figure 2. Frequencies of the Global Supply Chain Risk Events during 1999-2011[xi]

A bleak picture is drawn till now. The story of fragility and complexity in global supply chain networks will be incomplete unless the other side of the coin is thoroughly examined, which is risk intelligence.

In essence, risks carry the seeds of opportunities and intelligence ingrained. To this end, we must explore the seeds of risk intelligent supply chains. To achieve such a goal, this workshop will address three strategic questions:

- Can we design and operate a risk intelligent supply chain that is immune and also adaptable to various types of risks?
- What are the critical internal and external factors as well as dynamics we need to consider in this process?
- What managerial levers can we use to continuously increase the risk intelligence of our supply chain network?

These strategic questions will be examined with the actionable, thought-provoking, and strategically designed **I-Quartet Model.**[xii] Risk intelligent supply chains (coined as RISC) are supply chains that thrive and are resilient in the age of fragility. The road to becoming a risk intelligent supply chain needs a ladder of mastery which is an ever-continuing journey with a caravan.[xiii]

Supply chain risk intelligence is a strategic mindset that is composed of four interdependent and interacting roles given by the **I-Quartet Model**, namely ***Integrator, Inquirer, Improviser, Ingenious.*** These roles can be summarized as follows:[xiv]

- The ***Integrator*** role *integrates* and *orchestrates* global and local supply chain networks with a multitude of stakeholders such as suppliers, customers, employees, and partners. It capitalizes on the strategic and super-additive values

of networks while constantly reducing the *flow frictions in material, cash, people,* and *information. Risk interdependencies* in the supply chain network are managed intelligently, which, in turn, increases the robustness of the network.

- The ***Inquirer*** role constantly senses and learns in the age of uncertainty and fragility. It intelligently learns not only from *failures (small* and *large)* but also from *near misses, precursors*, as well as *weak signals*. The *Inquirer* role organizes its supply chain network to *deepen its vision on the peripheries.* As it learns, it enhances *anticipation capability* for supply chain network risks.
- The ***Improviser*** role makes a risk intelligent supply chain more *creative, resilient,* and *mindful* under extreme periods of stress and uncertainty. In this process, the *Improviser* role creatively uses *design thinking* and *oblique problem solving* approaches. It tinkers and muddles through with the *right level of diversity* and *flexibility* to achieve *supply chain network resilience.*
- The ***Ingenious*** role takes risks intelligently. It not only mitigates supply chain risks with the best available tools and methods, it also exposes the supply chain network to potential breakthroughs and blockbusters. It manages the two tails of uncertainty simultaneously with a delicate balance: It hedges against *negative black swans*. And it aggressively bets for *positive black swans.*

The workshop will present using trans-disciplinary thinking and models (ranging from disciplines such as authentic Turkish music, Jazz, natural ecosystems, psychiatry, complexity, extreme events and many more) how these strategic roles should operate and interact at individual, organizational, and supply chain levels to master risk intelligence. Through this learning process, a multitude of managerial insights obtained by executives of multinationals as well as Turkish companies such as Kordsa Global, Brisa, AnadoluJet (Turkish Airlines) will be shared and interpreted with the participants.

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[i] See http://www.goodreads.com/ for more of Richard P. Feynman's quotes.
[ii] Refer to the pioneering and unique book "Managing Supply Chains on the Silk Road: Strategy, Performance, and Risk" by Haksöz, Seshadri, Iyer (2011) for details on the Silk Road supply chains both in the historical and modern context and curious connections between them.
[iii] See the article at http://www.thebci.org/index.php?option=com_content&view=article&id=168&Itemid=256 (Accessed July 3, 2012).
[iv] The types of specific global disasters considered in this graph are as follows: Drought; earthquake, epidemic; extreme temperature, flood; industrial accident, insect infestation, mass movement dry, mass movement wet, miscellaneous accident, storm, transport accident, volcano, and wildfire.
[v] See the book "Risk Intelligent Supply Chains: How Leading Turkish Companies Thrive in the Age of Fragility" by Haksöz (2013).
[vi] Ibid.
[vii] Manmade disruptions analyzed are as follows: Product recall, breach of contract, contract termination, contract cancellation, strike, fraud, theft, sabotage, terrorism, espionage, product liability, labor disputes, port closure, political turmoil, geopolitical disruption, security breach, supplier default, bankruptcy, machine breakdowns.
[viii] Natural disasters analyzed are as follows: Flood, fire, landslide, earthquake, hurricane, tornado, storm, pandemic, epidemic, extreme weather, and climate change induced disaster.
[ix] Disruptions considered due to demand-supply mismatch are: Delays in product design, production, transportation, postponement, product shortage, stock-out, shortfall, unavailability, shipment delays, inventory write-off, raw material/component price volatility, commodity price volatility.
[x] Numbers in the parentheses denote the percentage of events in that respective sample.
[xi] See Haksöz (2013).
[xii] Ibid.
[xiii] Ibid.
[xiv] Ibid.

