

White Paper

SCRLC Emerging Risks in the Supply Chain 2013

Produced by the Supply Chain Risk
Leadership Council (www.scrlc.com)

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Introduction

“Change Is The Law of Life, and Those Who Look Only to the Past or Present Are Certain to Miss The Future”..... John F. Kennedy

The frequency and scale of major supply chain impacts from a variety of disruptive events continues to grow across the globe. Recently, a variety of events such as Hurricane Sandy, the Japanese earthquake/tsunami, floods in Thailand, Arab Spring protests, the Occupy Wall Street movement, and more have clearly demonstrated that significant impacts to businesses can, and will, result. Recognizing the potentially devastating impacts posed by a multitude of diverse and growing risks, every smart business must consider and plan for unknown disruptions if they wish to avoid, or at least mitigate to the maximum extent possible, the damage that otherwise could occur to their enterprise.

It's widely recognized that global supply chains and transport networks form the backbone of the global economy, fuelling trade, consumption and economic growth. These include the food and pharmaceutical supply chains which are critical to human life itself. Trends such as outsourcing, globalization, lean processes and the geographical concentration of production have made supply chain networks more efficient, but have also changed, and increased, their risk profile. Many enterprises have risk management protocols that can address localized disruptions. However, recent high-profile events have highlighted how risks outside the control of individual enterprises can have cascading and unintended consequences that cannot be mitigated by one organization alone. And the damage to individual companies, nations, and/or the global economy can be significant. The leaders of corporate boards and governments are increasingly understanding and being held accountable for tackling supply chain risk. This paper is designed to be a catalyst to encourage more thought and interaction on the topic of emerging supply chain risks. The contributors to it do not pretend to have identified all the emerging risks with respect to supply chains (these will in any case vary from one enterprise to the next) but we want to use this paper to encourage others to contribute their ideas. As a group, we have also discussed at length how to define a risk as emerging. In the end we decided this was not as important as recognising that supply chain risks will arise. We also hope it will encourage enterprises to look beyond the short term cost savings of their supply chain decisions to ensure they factor in longer term risks that could threaten their performance if not their survival. The SCRLC has drawn up Supply Chain Risk Management recommendations on www.scrlc.com which offers useful advice in this area. (Note: this website also provides information on the purpose, goals, and membership of the SCRLC)

We believe it is critical that enterprises, in addressing emerging supply chain risks, move from being reactionary to being proactive and resilient, KNOWING that at some point, somehow, and perhaps frequently, your business will be impacted by a supply chain disruption of one form or another.

Therefore, it is no longer sufficient to tackle many issues once they have started to directly affect your enterprise but they should be factored into your overall supply chain planning and operational processes in advance, with plans in place to respond quickly and effectively when these risks become reality.

The SCRLC has adopted a Supply Chain Risk Management (SCRM) Maturity Model to easily portray the levels of maturity that companies can measure their SCRM

posture against. Where does your company stand today? Are you prepared to face the types of emerging risks that are described?

**Supply Chain Risk Management (SCRM) Maturity
Determines an Enterprise’s Capacity to Address Emerging Risks**

SCRM maturity level	Risks
Reactionary	All risks
Awareness	Traditional risks
Proactive	Non-traditional risks
Integrated	"black swan" events
Resilient	Major emerging trends/risks

What follows is a sampling of some of the emerging supply chain risk areas that members of the SCRLC recognize and wish to share with a broader audience. Again, it is not meant to be all-inclusive nor specific to any particular business, industry, or nation. Rather it is simply meant to be thought-provoking: could such emerging issues affect your business? How? What are you doing to prepare? Is anyone even thinking about such issues? Where does your company’s SCRM capacity fit on the Maturity Model?

We hope you find our efforts of use in considering, planning for, and responding to the risks we all face in an increasingly global and connected world.

1. Climate Change

Independent of the cause, it is widely recognised that climate patterns appear to have changed on a global basis, particularly in their variance from past norms. This is creating a number of different issues which threaten supply chains. For example there have been unusual flood events in certain parts of the world and droughts in other areas. The impact has been seen in agricultural production in 2012 with the issues in the US and Europe due to the different extremes of the weather with in one case there being too little rain and in the other there being too much.

There have also been other severe climate effects such as winter storms in terms of wind damage and snow/ice conditions. These changes given they continue in the medium term will also create population shifts and further political challenges due among other aspects to the shortage of food and water in certain areas of the world.

It should be noted again that these risks also present opportunities, for example in the Mc Kinsey Quarterly July 2008(Chris Brickman and Drew Ungerman) “Our analysis suggests that for consumer goods makers, high-tech players, and other manufacturers, between 40 and 60 percent of a company’s carbon footprint resides upstream in its supply chain—from raw materials, transport, and packaging to the energy consumed in manufacturing processes. For retailers, the figure can be 80 percent. Therefore, any significant carbon-abatement activities will require collaboration with supply chain partners, first to comprehensively understand the emissions associated with products, and then to analyse abatement opportunities systematically.”

How does a SCRM practitioner respond to these climate changes? There are a number of actions that can be taken both in the short and the longer term. One of the basic checks that can be made is to understand whether any of your key supplier locations are likely to be affected by floods or other adverse weather events. This should also include consideration of the basic inputs to the production processes such as the adequacy of the water supply or other aspects of the utilities infrastructure that might be adversely impacted by weather conditions. Having established key supplier locations you can then also look at Business Continuity Planning in terms of its adequacy this can both within your own enterprise but also in terms of the supplier do they have further production sites with adequate capacity. As has been observed recently those companies that were better prepared for issues such as the Thailand Floods have also been able to use it as an opportunity to improve their performance over a competitor who was less well prepared.

A number of companies are also addressing the opportunity to respond to what many think is the key cause of climate change, carbon emissions. This action recognises the pressure coming from consumers and governments to improve in this area.

2. Global, JIT, Lean Supply Chains

There has been a general trend through the adoption of lean approaches to reduce capacity across industries and in a number of cases to create single points of failure. This has efficiency benefits but if the right balance is not achieved it can, when combined with JIT, lead to a significant increase in supply chain disruptions.

Average U.S. industrial capacity utilization from 1972 to 2011 is 80.3%, with peaks around 85% in 1988-1989 and 1994-1995 and a low of 66.8% in 2009, according to the U.S. Federal Reserve. In May 2012, total industrial capacity utilization was 76.3%. These overall figures also mask specific capacity constraints in, for example, a low margin sector or one facing new regulations leading to capacity being withdrawn from the market.

A number of recent disruption events such as the Icelandic volcanic ash and the massive Japanese earthquake and resultant Tsunami in 2011 have quickly stopped sections of automotive and other supply chains at considerable cost. An issue around the destruction of a black pigment plant caused substantial automotive issues because it was a key point of failure in the supply chain. The current issues around rare earth metals and China also is just one indication of how raw materials within a supply chain can create significant issues.

How does a SCRM practitioner respond to this increase in capacity constraints and pressure on key commodities? An initial step can be to map out the critical supply chains that you have and understand which of the suppliers/supplies potentially represent a single source of failure. Driving transparency is one of the key areas to reduce supply chain risk. There are then a number of other steps that can be taken such as development of alternative suppliers, technological changes in the product make up, etc. As a means of tracking potential capacity issues you can also monitor your supplier in terms of delivery times if there is a slippage in these it can indicate a capacity or other issue which can be followed up in terms of a supplier audit. In a number of cases dual sourcing can be a valid strategy.

3. Increasing Social Inequity and Potential Supply Chain Risks

Today's news is filled with routine stories of social unease, protest, and violent responses to global and local imbalances in wealth distribution, employment opportunity, and a perceived unfairness of the global economic system. Just a sampling of recent events attributable to social inequity includes:

- The Occupy Wall Street movement in the US; the 99% vs. the 1%
- Violent riots in the UK and France by disaffected populations
- Growing protests and tensions in China due to an underclass who feels left out of and exploited by China's economic boom
- Millions of unemployed youth across the globe who cannot find meaningful employment in the current economic downturn
- The Arab Spring, triggered by the frustrations of an underclass who felt economically and politically strangled by existing conditions

In the U.S., the richest 1 percent holds 34.5% of total wealth, while the bottom half of Americans hold just 1.1%. China's richest 1 percent holds 70% of the nation's wealth. Just less than 1% of household's globally control nearly 40% of the world's financial wealth. (Source: Pat Garofalo, Think Progress, August 17, 2012).

How do such conditions, particularly when worsening, contribute to a potential increase in supply chain risk?

At a tactical level, violent Occupy Wall Street protests targeted US ports, shutting down operations, stopping the movement of goods, and directly creating supply chain disruptions. At a more strategic level, events caused by social inequity in Tunisia, Egypt, Libya, and now Syria have disrupted entire economies and the ability of businesses to operate in, import, or export from those nations for extended periods of time.

Looking forward, a reasonable person should expect that continuing rise of global social and economic inequity will create increasing frustration and uprisings by a disaffected underclass. These inequities may unpredictably explode into violent protest or revolution at a local, regional, national, potentially global scale. What does this mean for your business and your risk management of existing and future supply chains? A SCRM practitioner must consider how these inequities might impact their supply chain operations, particularly if sourcing from or operating in countries with known social inequities and a history of public backlash that could erupt in an instant.

Evaluate factors such as:

- Where do we have supply chains or operations that are exposed to risks from social inequities?
- How would we continue to operate in the event of massive protests, port closures, or even an overthrow of the government?
- Do we have a backup plan or dual sourcing?
- Do we begin to shift or restructure operations to mitigate these risks?

Social inequity, combined with a seemingly growing willingness of local populations to challenge existing systems, is virtually certain to create risks for businesses and their global operations. Think through how this could affect your business and plan accordingly.

4. Gender Imbalance and Future Supply Chain Risk

One might logically wonder how gender imbalance (a disproportionate, comparative level of males or females in a population) could possibly affect their supply chain.

Yet, one need only to look at the situation in China, arguably considered the "world's factory", to understand how this issue could ripple into the future of global industry and supply chains.

In China, "this vast nation is confronting a self-perpetuated demographic disaster that some experts describe as "gendercide" -- the phenomenon caused by millions of families resorting to abortion and infanticide to make sure their one child was a boy." (Source: Eric Baculinao, NBCNews.com, September 14, 2004). China will have 30 million more men of marriageable age than women in less than 15 years due to the gender imbalance caused by China's tough one-child policy. (Source: Chinese State Media, January 12, 2007). India faces similar gender imbalances as that nation, too, has a cultural history of favouring boys over girls in family structure.

Experts are alarmed at potential societal disruptions that may occur due to such extreme gender imbalance, the most disproportionate imbalance in history. Gender imbalance could lead to a flood of rural males to cities seeking a future wife, creating urban overpopulation and agricultural disruptions and food shortages due to a lack of rural workers. Factories, businesses, and supply chains dependant on female labor (garment industry, assembly lines, etc) may experience extreme shortages of workers and an inability to sustain production rates. In a worst case, broad social disruption could result from large populations of males frustrated by the paucity of female partners.

How does a SCRM practitioner respond? Evaluate if or how such an imbalance could affect your business or your supply chain, i.e., does your business depend on large numbers of female workers in China, India, or other nations with looming gender imbalances? Will those workers be available in a decade? Should you potentially consider shifting operations over time if an imbalance might impact your operations? Should you place future work in a factory that may not be able to sustain future production?

While perhaps not your top SCRM concern, gender imbalance is, in fact, a real and growing problem that is expected to reach a critical stage by 2020 in China.

5. Increased Population

If we fast forward to the year 2050, the environment is likely to have suffered immensely from an economy based on mass consumption by 9 billion people. Energy prices may have continued to rise, as most of the easily accessible fossil fuel reserves are depleted. As such, unconventional deposits such as the Tar Sands in Canada and shale deposits in Venezuela may have become major sources for oil.

This population growth will because of the pressure it puts on resources, threaten social unrest.

Given the shift in energy and geo political realities, logistics and supply chains will need to react and shift to meet the burdens of society. In one scenario, it is not too difficult to see Asia as the center of a thriving world trade. Former emerging countries will turn into high tech locations of global importance and centers of consumption. Low cost production will shift to other regions that previously had been economically less relevant. The logistics industry is poised to benefit

tremendously from the steady increase in movement of parts and goods. Of all modes, maritime is predicted to see the greatest increase. Climatic change can have a dramatic impact on shipping routes. Arctic routes may become navigable while more extreme weather may impact traditional routes. The summer of 2012, with the extreme drought and weather patterns may be a glimpse of the future. It is not too difficult to imagine a "supergrid" covering the entire world. Each economic region has one hub with spokes for global logistics optimized for intermodal transport. Cargo ships will continue to grow in size, which will require larger and more efficient ports to handle the volume. As such, the dimensions of trailers, containers and pallets will need to be internationally standardized.

6. Population Migration: Urban vs. Rural

Societal changes will have direct effects on the economic and social gap between urban and rural areas. Since the 1950's urbanization has been increasing rapidly and will continue to do so. For the first time ever, in 2007 more people lived in urban areas than in rural areas. The number of cities with more than 5m citizens is expected to increase from 49 in 2006 to 75 in 2020. This is especially true in Asia and Africa. To quote Dr. Yuwa Hedrick- Wong Economic Advisor, Mastercard Worldwide, "The possibility that social tension will be created is very high" "Urbanization is clearly a strong trend. You will end up with a scenario of 75%, 80% even 90% of the population living in urban areas, megacities, metropolitan regions and so on"

The United Nations in 2009 published a very interesting chart that has tracked Increasing Urbanization since 1950, and projects the trend to 2050.

1950: 28% of population or 2.50 bn people live in urban areas

1970: 35% of population or 3.7 bn people live in urban areas

1990: 43% of population or 5.3 bn people live in urban areas

2010: 51% of population or 6.9 bn people live in urban areas

Based on historical trends, the UN has projected growth to 2030 and 2050 as follows:

2030: 59% of population or 8.3 bn people living in urban areas, and;

2050: 69% of population or 9.1 bn people living in urban areas

A consequence of this shift to urban population will be shifting large investments to a few growth zones in order to develop the infrastructure. These zones will attract substantial investment and prosper. Similarly, and coincident to the timing, rural areas will be increasingly neglected and could very well become impoverished.

Along with this trend toward urbanization, one can also see that the populations in rural areas will age. Young people will continue to move to cities and large metropolitan areas, while the older population will most likely stay in more rural areas. This will stress the infrastructure in many ways, including schools, police, fire, postal service, etc. Given projected demographic changes, this development will be dramatic, especially in China.

With the increasing population density in urban areas, tensions between various cultural groups will tend to increase. Any increase in terrorist acts and civil disturbances could have enormous consequences for the global economy and supply chains. While experts agree that these consequences are manageable as it relates to the free exchange of products and information, the cost to secure will come at a very high price. This is particularly true as it relates to the transportation of goods and people.

The population migration will present significant challenges to logistics and supply chain professionals, city planners, politicians and the like. Some of the challenges that are to be faced are:

- Lack of appropriate transportation infrastructure leading to massive traffic congestion. Recent estimates of London traffic movement are in the range of 15km/h. Even before the advent of the horse drawn carriage in the 19th century, traffic in Center London moved faster.
- Shortage of (affordable) space leading to urban sprawl. The consequence of this is that freight as well as passenger transport will need to cover additional kilometers.
- Pollution increase
- Low service levels in central city areas (on time delivery)
- Higher on site storage requirements
- Higher city complexity and customer demand which will lead to high logistics cost to service those demands.
- Greater e-commerce utilization, leading to increased parcel delivery in urban markets, requiring innovative methods to assure on time delivery.
- It will also create more challenges around the economics of supply chains in rural areas.
- Costs and appropriate spaces for production facilities.

7. Global Democratization Movement

In many regions of the world, particularly in volatile areas such as the Middle East and Africa, where social unrest has increased in recent years, there is a growing risk of governmental collapses or takeovers, as well as shifting geopolitical alignments.

As to governmental takeovers, one movement that has been particularly prominent is the Arab Spring. This is a popular banner democratic movement in the Middle East and North Africa, which evolved after years of authoritarian rule in places like Egypt and Libya. While followers of this movement hope to end years of corruption, political repression, and economic disparity, there is also the threat of chaos and disorganization that could arise from new political systems being established by individuals with little governing experience. Furthermore, with many current rulers hoping to maintain power, when constitutional reforms are not pursued, lethal force has been employed, which can lead to greater conflicts, as was seen in Libya, and is on-going in Syria. According to one report, more than 22% of businesses around the world have experienced a negative impact from this movement, which includes many supply routes in the regions that have been disrupted, leading to longer shipping times and other logistical problems (Grant Thornton International Business Report, 2012). While this movement could extend the influence Arab Spring countries have in the world markets, until there is stability in this newly implemented economic process, these countries could become inert, or even a hindrance to the world market when there are products coming from, or being transported through their region. In Latin American countries, one of the primary concerns is movement away from the "Rule of Law" resulting from the growing threat of large criminal organizations. Rival drug cartels in Mexico have become prominent, particularly through government corruption. The national homicide rates in El Salvador, Guatemala, and Honduras, as a result of extreme gang violence, substantially interferes with the governing of those countries. In contrast, countries such as Venezuela, Argentina, Bolivia, Ecuador, and Cuba where the governments maintain control through strict repression, trade and business activities are adversely impacted. Overall, when considering the region as a whole, whether there is the chaos of

gang activity, or the oppression of governments, the region is very volatile. These factors, coupled with the United States' decreased influence in the region, creates a risky environment for supply chain manipulation, with countries such as China, Russia, and Iran stepping in the void left by the United States.

From a supply chain perspective this again calls for appropriate initial due diligence around the countries in which you establish your upstream supply chain and also the appropriate on-going monitoring to ensure the appropriate mitigation steps are in place.

8. Dependence on Information Technology

With the world's ever-increasing dependence on information technology, a growing risk that must be confronted is the potential for cyber-attacks against governments, business, and leaders by targeting communications, trade, defence, and/or infrastructure. The United States Administration's study on the current state of information technology has declared that "the cyber corruption threat is one of the most serious economic and national security challenges we face as a nation.... America's economic prosperity in the 21st century will depend on cyber security." The sophistication of cyber-attacks reaches beyond computer systems and networks, to interdict the sourcing systems of the original information and data. Software such as Malware allows electronic intruders to operate unimpeded within accounts and other data servers to disrupt operations or gather sensitive information.

Within Supply Chain Operations, we must improve our resilience to cyber incidents and reduce the cyber threat. A comprehensive supply chain cyber security program includes strategy, policy, and standards regarding the security operations in cyberspace. It addresses threat reduction, vulnerability reduction, deterrence, international engagement, incident response, and resiliency. The program needs to identify recovery policies that address computer network operations, information assurance, law enforcement, diplomacy, military, and intelligence missions as they relate to the security and stability of the global communication infrastructure. Addressing this problem will require collaboration and goal alignment among security, information technology, and supply chain leaders throughout the whole of each critical supply chain or network.

9. Government Financial Crises

A number of governments, such as Japan, Greece, and Italy have very high and growing debt as a percent of their Gross Domestic Product. See for example the CIA's *World Factbook* @ <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2186rank.html#> such high debt can lead to risk of default or hyper-inflation which wipes out the value of the debt. To avoid default when lenders are no longer willing to finance further debt, many countries must raise revenue through higher taxes on individuals and commerce and reduce expenses such as infrastructure investments and social safety nets, the latter of which can lead to unrest as recently demonstrated in Greece and other European countries. In some cases, it can lead to nationalization of key industries. It also often leads to crippled political and government systems such as regulations. Consequently, supply chain professionals need to factor government debt into their decision making.

For example, hyper-inflation could significantly devalue an enterprise's investments in a specific country. It could wipe out any savings from operating in the country due to much higher costs of inputs to production. Lack of investments in infrastructure could make it difficult to continue to operate or expand operations in a country if roads, rails, and air and seaports become

congested, or worse, dysfunctional. Higher taxes on enterprises and commerce, and possibly protective tariffs could also adversely affect the profitability of operating in a country. Lastly, slow or erratic regulations and government operations could further hinder efficient supply chain operations.

10. Government Social Policies

Government social policies focus on welfare and social protection to include benefits such as retirement, disability (i.e., physical and learning), medical (i.e., physical and mental), unemployment, education, housing, and food as well as crime, poverty, and discrimination (e.g., race, religion, and gender) protection and the redistribution of income from those who have more to those who have less (Spicker, Paul, An Introduction to Social Policy, as of September 10, 2012 @ <http://www2.rgu.ac.uk/publicpolicy/introduction/socpolf.htm>). Supporting social policies usually involves governments taxing individuals, enterprises, and commerce as well as borrowing to raise the revenue to support social policy programs. And, when governments can no longer borrow, they must either raise taxes or cut benefits (i.e., reduce the social "safety net." Depending on how governments expand or contract their social policies, one or more groups may be adversely affected leading to social unrest. One of the early examples of this was the Boston Tea Party when British colonists protested taxation without representation. Recently, the more global Occupy Wall Street is an example of protest against the uneven distribution of wealth. And, the so called "Arab Spring," is about both political and economic inequalities.

Supply chain leaders need to be aware of growing disparities and threats to government social safety nets that foster social unrest, which can lead to serious supply chain disruptions as roads, rail, and air and sea ports are blocked or destroyed, labor strikes or sabotages production, gangs, cartels, or political groups terrorize citizens, and/or general anarchy reigns. Such unrest can also lead to rapidly changing policies, regulations, taxes/tariffs, and government paralysis from political division. While supply chain professionals are unlikely to be able to do much to affect the factors underlying unrest, they need to be aware of their likelihood and potential consequences, and make plans accordingly, particularly for future investments in capacity or back-up capacity development.

11. Global capital/economic/banking system disruptions

It is the case in respect of nearly all supply chains that not only do they depend on a physical flow of goods, but that they have associated with them relevant financial flows. This can range from various types of supplier financing, currency exposures, interest exposures or other financial trade instruments. The lack of confidence in the financial markets at a macro or micro level can have the same impact on a supply chain as that which would arise out of say the physical closure of a port.

Access to capital is more expensive these days and more difficult. In a number of cases demand has dropped off, customers are paying more slowly and working capital is being tied up in inventory and slow-moving receivables.

Well-managed companies need to consider embedding effective working capital management and associated tools into sustainable processes to minimize related business risk across their customer and supply chain base.

As companies are becoming more concerned about the rising risk in their supply chains stemming from the economic stress on suppliers, volatile commodity and energy prices, and broad-based financial turmoil, management needs to actively look at supply chain finance options. These actions can help in terms of lowering

their overall financial supply chain costs, increased supply chain stability, and the efficiencies that this offers to both buyer and supplier.

There are a number of options open to organisations to help mitigate these financial exposures including:

- Appropriate analysis and monitoring of the countries/currencies/financial infrastructure in which you intend to trade with
- Due diligence around specific trading partners including associated financial institutions
- Consideration of appropriate hedging strategies
- Use of a third-party financier to provide liquidity to suppliers by leveraging their buyer's higher credit rating where this is available

12. Social Media Threats

As use grows, the risks from social media are also growing. A June 2012 study by Deloitte and Forbes Insight ranks social media "as the fourth largest source of risk over the next three years. "[1] Executives worry about "cyber-attacks [e.g., denial-of-service worms, Trojan-horse scripts, and E-mail viruses], breaches of confidentiality, fast-spreading malicious rumors about the company, as well as financial disclosures." As networks have become more secure, hackers are turning to social engineering to gain access by tricking unsuspecting employees into letting them into corporate networks.[2] Indeed IBM recently found that while span is declining social phishing is increasing.[3] So called "phishing" scams, which were originally designed to obtain financial information from individuals by taking them to phony Websites, now also target business users.[4] Some of the "bait" these sophisticated "phishers" use comes from information shared on social media. In addition, social media has been used to arrange "swarm" attacks, where a large group of individuals descend on an establishment and overwhelm personnel to plunder, loot, and sometimes kill.

Complex supply chains with many different partners communicating with one another offer numerous opportunities for those with malicious intent to gain access to both supply and product movements as well as internal enterprise intellectual property, finances, and sensitive customer and supply partner information. Social media provides a vehicle for possible entry into sensitive information systems as well as for organizing malicious attacks. Consequently, supply chain professionals need to be aware of the growing risks from social media and work with their partners to enhance security and the awareness of social media threats as well as design their networks and facilities to be as robust as possible and to have plans in place to quickly recover from any disruptions.

13. Growth of Mega Cities

Megacities are those metropolitan areas that have grown beyond 5M population. Rapidly-growing megacities present a challenge for the downstream ends of companies' supply chains. These megacities' high population densities, congested infrastructure, fragmented retailing environments, and regulations pose challenges to the last dozen miles of the supply chain. Today's new megacities are largely found in developing countries, whereas of the 600 largest cities in the world, 71% are in developing countries. And by 2025, the top 600 cities will represent 60% of the global economy (compared to 54% in 2007). With growing populations and rising economic activity comes rising supply chain volume -- more and more goods will be flowing into megacities.

These new cities have population densities over very large areas that are far above those in the developed world -- up to 29,000 people per square kilometer. These densely populated urban centers create new supply chain challenges and opportunities.

The other issues arising in these cities include socio economic contrasts, transport systems that tend to focus on people not freight and the fact that distribution centers are moving out of the middle of the cities to out of town. The movement of distribution centers outside of town has also increased the mileage required for the final drop off. This together with the number of stops involved is contributing considerably to the costs involved, this could be as much as 20-30% of food costs, for example.

These Mega Cities are thus driving a need for revised approaches to dealing with logistics, from both a cost and availability perspective.

The above is largely extracted from work by Dr. Edgar Blanco of MIT CTL at the "Crossroads 2012 – Supply Chains in Transition: The Driving Forces of Change"

14. Aging Population

One of the key risks recognised in World Economic Forum report is "unsustainable population growth". A significant trend within this is the number of people over 60 years of age, this has risen from 8% in 1950 (200m people) to 11% in 2009 (760m people) by 2050 this is expected to double again in percentage terms 22% (around 2 billion people). Currently, the number of people over 60 is growing at 2.6% against an overall population growth of 1%. This on-going increase and dependency is set against a background of heavily indebted governments and overall social challenges based around issues related to the fact that 1% of the world's population owns around 40% of the world's assets.

In terms of supply chain risks this has a number of potential implications:

1. As people in countries move through to retirement it will potentially create resource and skill gaps, which will need to be taken into account when organizations consider where to base themselves.
2. The potential burden placed on governments, organizations and people in caring for this larger elder population will create financial and time pressure on the resources that are available. This will need to be taken account of in terms resource allocation and relevant tax burdens.
3. There could be new opportunities and risks associated with the handling the logistics with supporting an ageing population in a more urban environment i.e. delivery to homes in the "Mega Cities" see other section.
4. If the burden of supporting an ageing population in a particular country becomes very high, then there is a danger this could create social unrest with consequential impacts again on relevant supply chains.

Appendix 1

Sources of Supply Chain Risk insights

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Appendix 2 – References

5. Increased Population

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