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# Logistics & Transport focus



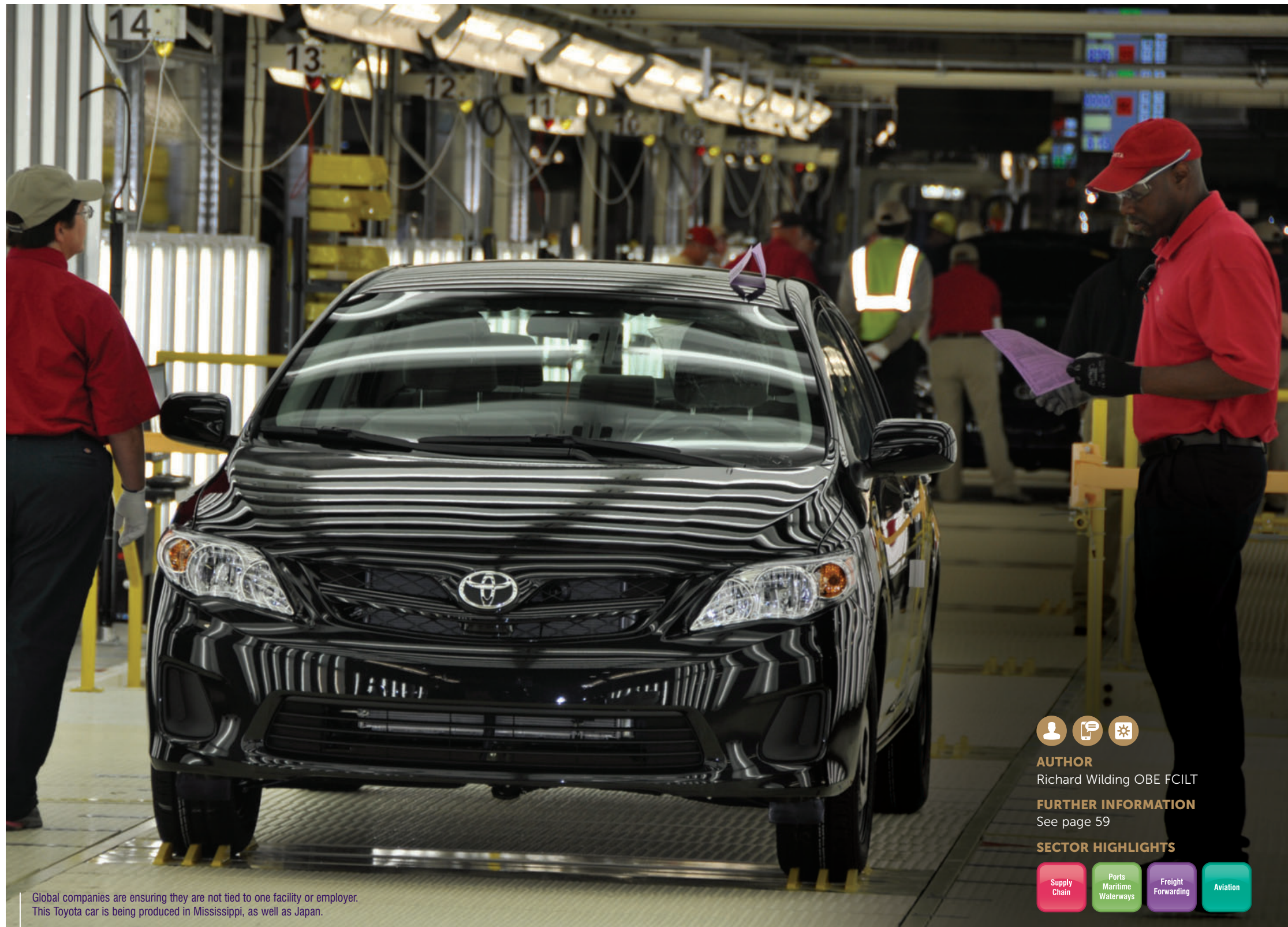
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we are  
stronger  
together**

Stronger Together





# Supply chain temple of resilience



Global companies are ensuring they are not tied to one facility or employer. This Toyota car is being produced in Mississippi, as well as Japan.



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**SECTOR HIGHLIGHTS**



Above: The eruption of Iceland's Eyjafjallajökull volcano saw clouds of ash ejected high into the sky, and quickly brought about the closure of much of Europe's air space and the subsequent cancellation of some 95,000 flights. Five days later, the assembly lines at Ford's Flat Rock, Michigan, assembly plant ground to a halt, Volkswagen and BMW were also hit, and even plants as far away as Japan were affected.

Richard Wilding OBE FCILT explains why we should worship at the temple of supply chain resilience.

The 2010 eruption of Iceland's Eyjafjallajökull volcano saw clouds of ash ejected high into the sky, and quickly brought about the closure of much of Europe's air space, and the subsequent cancellation of some 95,000 flights. Five days later, the assembly lines at Ford's Flat Rock, Michigan, assembly plant ground to a halt, an outage that was to last for four days. Volkswagen and BMW were also hit, and even plants as far away as Japan were affected, where Nissan was forced to halt production at two plants.





Almost exactly a year later, in March 2011, an earthquake and tsunami hit the north-east coastline of Japan. Honda, Toyota, Nissan and Subaru all had plants in or close to the affected region, and were forced to close them. Other Japanese automotive plants, far from the affected region, were also forced to stop production, because of parts shortages caused by logistics difficulties or by earthquake or tsunami damage to tier 1, tier 2 or tier 3 suppliers' plants.

Within days of the earthquake and tsunami, the shutdown had spread beyond Japan. En masse, Toyota's plants in China, Europe, and North America ceased production or went on to short-time working. In the UK, Honda cut production at its factory by 50% for seven weeks, while three Nissan plants in the USA also shut down.

Non-Japanese automakers were also hit. From electronics equipment to paint, and from engines to gearboxes, huge numbers of components turned out to be sourced from Japan and its intricate

Above: In March 2011, an earthquake and tsunami hit the north-east coastline of Japan. Honda, Toyota, Nissan and Subaru all had plants in or close to the affected region and were forced to close them. Other Japanese automotive plants, far from the affected region, were also forced to stop production, because of parts shortages caused by logistics difficulties.

Below: Is your temple of supply chain resilience built to withstand the worst disasters?



supply chains. Worse, many of these were single sourced, and often not just to a single company but also to a single plant within that company.

Months later, Thailand saw the worst flooding for 50 years, which simultaneously hit seven of the country's largest industrial zones, causing factory output to fall by 36% in October 2011. All nine of the Japanese car-makers with operations in Thailand were forced to suspend operations, and two of the world's largest manufacturers of hard drives – Seagate and Western Digital – had factories flooded.

**Call to action**

It is fair to say that such events have served as something of a wake-up call to businesses with extended supply chains. Throw in the effect of an unexpected shift in exchange rates, such as the US dollar vs Asian currencies, and equally unexpected rapidly rising wage rates in China, and the result has been a something of knee-jerk reaction.

As a result, after a decade-long dash to globalise their supply chains, many of the world's large manufacturers have paused to reflect on the strategy that they have been following, and are in some cases moving to once again shorten supply chains as a way of reducing risk. After off-shoring, in other words, comes near-shoring and even re-shoring.

But is this the right strategy, or does it risk manufacturers throwing out the baby with the bath water, actively adding cost to supply chains in an attempt to make them more resilient? In other words, might it not be better to address the root causes of that lack of resilience?

**Temple of supply chain resilience**

When examining the root causes, one thing is clear: organisations seem to have little understanding as to how decisions made at a strategic, tactical or operational level subsequently impact the risk profile of supply chains.

The greater adoption of lean practices, for instance – as the examples highlighted above illustrate all too clearly – dramatically changes the risk profile of supply chains, with the focus on just-in-time practices directly resulting in a greater vulnerability to supply chain disruption from events such as ash clouds, floods, and earthquakes. Similarly, so does the increased use of

focused factories and distribution centres, the move to outsourcing and supplier consolidation. Each is a worthwhile endeavour, but all result in a change to the risk profile of supply chains.

The good news is that by following some simple guidelines, organisations can mitigate against these risks, without necessarily retrenching en masse from the benefits of the longer supply chains that bring them about. How? By using a conceptual framework that I call the temple of supply chain resilience. Here is how it is built.

**Foundation of effective supply chain strategy**

Supply chain resilience is built upon the foundation of an effective supply chain strategy: in other words, the operational execution of the business mission through the supply chain. To achieve this, managers need a clear understanding of the business mission in the context of the competitive strategy of the business, as well as the markets within which it operates.

For a supply chain strategy to be effective, four distinct aspects of supply chain management must be aligned with the business mission: supply chain processes; the supply chain infrastructure, including where facilities are located and what equipment is used; the supply chain information systems; and the supply chain organisation itself.

Examples of this in practice include Apple and fashion firm Zara, which certainly stand out as businesses with supply chains perfectly aligned to their own, very different business strategies.

**Product design for supply chain**

Next, comes the floor of product design for the supply chain, and here, the message is simple: be careful not to design additional risk into your products.

During the product design process, ensure that the implied supply chain is considered – for example, what materials are used? Would alternative materials reduce risk? Could the product function just as well if manufactured with different grades of steel, and could steel be substituted with aluminium or even plastic? Can electronic equipment function using components from different manufacturers? Where does the final customisation and configuration of the product to local customer and market requirements take place?

By applying such principles and asking questions during the design stage, it often turns out that simple modifications in the product design can greatly increase the resilience of the supply chain for that product. As an example, look at Nissan and Toyota. Post-tsunami, product development processes have been altered, specifically to capture greater opportunities for resilience through such devices as dual sourcing and supplier selection.



Above: During the 2011 Thai floods, global sourcing giant Li & Fung was able to switch textile production seamlessly from Thailand to China

**First pillar: supply chain collaboration**

Look at businesses that have survived major disruptions to their supply chain and you will typically see effective supply chain collaboration in action.

To create a truly resilient supply chain, successful and mutually rewarding collaborative relationships are key, but organisations often overlook the investment in internal resources required to manage such relationships. That is short sighted and, in the event of supply chain disruption, potentially damaging.

One of the best examples of this comes, again, from the automotive industry. When a fire in 1997 devastated the premises of Toyota's supplier of brake master cylinders, Toyota vehicle production halted across Japan. Twenty other suppliers then retooled, set up jury-rigged production lines and trained workers to make the parts. Vehicle production restarted three days later.

**Second pillar: supply chain design and engineering**

To maximise supply chain resilience, it is important that supply chain risk management is integrated into the design of the supply chain. The logic is that a





supply chain that has simply evolved over time will not be as resilient as one in which network design principles have consciously been applied to balance efficiency against redundancy.

In practice, supply chain design and engineering involve making conscious decisions about such things as where inventory is held, how much inventory is held, the desirability of alternate sources of supply, supplier development in order to reduce risk and postponement.

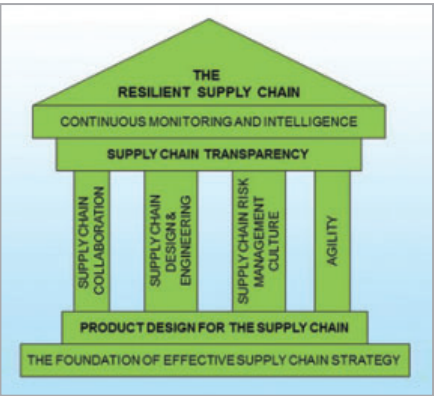
Also important is having an understanding of the network that connects the business to its suppliers and, in turn, to their suppliers, and the downstream links that ultimately connect to the end-customer. Again, the tsunami has taught valuable lessons. Merck, the owner of a Japanese factory that was the world's sole source of an automotive paint pigment, has announced the setting up of a duplicate production line in Germany.

Third pillar: supply chain risk management culture

A business's internal culture has an impact on its supply chain resilience, in terms of mitigating against risk and in dealing with disruption once it has occurred. In short, contemplating a given action, the business should ask itself: how will this action impact on the risk profile of the supply chain? Will it make us more vulnerable to disruption to events? Will it make us better able to cope with disruptions?

Above: Apple is an example of a business with its supply chains perfectly aligned to its business strategies. This is a Hon Hai-Foxconn Apple production facility, one of several such global manufacturing sites.

To maximise supply chain resilience, it is important that supply chain risk management is integrated into the design of the supply chain.



Such a supply chain risk management culture does not occur by accident, and typically requires a leadership that encourages the organisation to respond to disruptions in an appropriate way and a top-down review of how company policies and practices can impact on the risk profile of the supply chain. Assigning formal responsibility for supply chain resilience and the creation of supply chain continuity teams can also help.

During the September 2000 fuel crisis brought about by striking tanker drivers, some businesses fared better than others. Supermarket chain Sainsbury's, for instance, was able to activate a team of supply chain contingency planning experts, helping it to make day-to-day decisions.

Fourth pillar: agility

To reduce the overall risk of a supply chain and to increase its resilience, an element of supply chain agility is clearly vital. The trick lies in achieving the required level.

Agile supply chains not only need to be network based, but they also need to be market sensitive, with highly integrated virtual and critical processes. What is more, if they are to respond in ever shorter timeframes to volume and variety changes, agile supply chains need to synchronise supply and demand. The agile supply chain also needs to be able to adjust output quickly to match market demand or post-disruption supply constraints, and to switch rapidly from one variant to another.

As an example of the art of the possible, consider global sourcing giant Li & Fung. During the 2011 Thai floods, it was able to switch textile production seamlessly from Thailand to China, sometimes in as little as four hours, thus minimising the impact on its western fashion chain customers.

Supply chain transparency

Straddling these four pillars is a requirement for supply chain transparency. Simply put, transparency of what is happening within the supply chain system is critical to risk mitigation.

When everyone knows what is going to happen, confidence increases because of this transparency and trust develops between all the players in the supply chain. On the other hand, if there is no transparency, then people will often build in costly and unnecessary protection, such as holding inventory just in case, or asking for product in advance of when it is really needed, because it might be late.

Transparency can be gained by a variety of initiatives, and by the application of appropriate technology – for example, mapping techniques, GPS and RFID, alerts and similar measures. In short, as supply chain professionals, our aim should be to put clear windows into our supply chain processes.

As an example, consider the kinds of track-and-trace capabilities offered by international freight carriers such as Fedex and DHL. Instead of seeing goods in transit as an unwelcome blind spot, such carriers' customers now have near real-time visibility into exactly where their shipments are.

Continuous monitoring and intelligence

Finally, overarching all of this is a need for continuous monitoring and intelligence. While supply chain transparency provides a window into what is happening within the supply chain, continuous monitoring and intelligence puts the supply chain in context, gathering data on local and world events. If a natural disaster makes the news, for instance, an effective continuous monitoring and intelligence process helps to ask the question: how will this impact on my supply chain?

That said, continuous monitoring and intelligence does not happen by accident. Intelligence needs to be gathered, and an effective process put in place so management can review and act quickly on this intelligence, in order to mitigate supply chain risk. Again, collaboration with supply chain stakeholders helps to make this happen.

As an example of best practice, consider BMW. An initiative called proactive risk management sees the German automotive giant digitally map the location of every first, second and third-tier supplier, overlaying on this geolocation picture a number of data feeds on weather, natural disasters, and political and economic risks. The result is that when something happens, the company can instantly see whether or not it might be affected.

Conclusion

Remember that competition is no longer between individual companies but between supply chains. Resilient and risk-minimised supply chains will compete more effectively than supply chains that are not, which is precisely why it is in every organisation's interest to build its own temple of supply chain resilience, in order to ensure sustained competitive advantage into the future.

About the author

Professor Richard Wilding OBE FCILT is board member of CILT and Professor of Supply Chain Management, Centre for Logistics & Supply Chain Management, Cranfield School of Management. Cranfield works with companies from all sectors on supply chain development initiatives.

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