The construction industry in the US counts on the global marketplace, including China, for its materials and supplies. But, as parts of industrial China take actions aimed to limit spread of the coronavirus, businesses that depend on Chinese imports will start to run out of those goods.

As the situation evolves globally what has become clear is that the epicenter of the outbreak, Wuhan City in Hubei province, is an important hub in construction materials and supplies. There, according to a Bloomberg report, 13 manufacturers are identified as producing construction materials, but there is much more to the picture. Of the more than 500 manufacturing facilities in Wuhan, 164 could easily be identified as potentially affecting construction projects via raw materials, components, or other vital products. Additionally, there are also almost 200 facilities domiciled outside of China located in Wuhan. So, while it would be easy to focus solely on products coming from Chinese-owned companies, supply chains will also be disrupted from other trading partners operating facilities in China, and increasingly by the COVID 19 outbreak spreading globally as counties around the world increasingly shut down.

Even more disruptive than the direct effect in Wuhan, is the impact to the rest of China. Virtually all cities, regions, and provinces have some form of quarantine, travel limitations, and/or worker migration restrictions which have huge impact on all regions regardless of how many cases are currently being reported.

Workers who traveled home for the Lunar New Year were unable to return to work in Guangdong, Zhejiang, Henan and Jiangsu, four of China's primary manufacturing regions, which also happen to be among the 10 most afflicted provinces. The net result is that many factories are sitting idle and could not resume work quickly even if those orders were lifted. Even after the worst is over and workers can move freely, there will still be the risk of re-emergence due to crowded working conditions.

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A very interconnected marketplace
While many will look back 17 years ago at the severe acute respiratory syndrome (SARS) virus outbreak for direction, the world has changed significantly since then. SARS paralyzed the Chinese economy for the first months of 2003, but the impact receded quickly. However, times have changed. It is a larger challenge to compartmentalize the damage. China has a much bigger role in global supply chain networks now, accounting for about 16% of global economic output, versus 4% in 2003. [McKinsey Global Institute report, June 2019] In the past, China supplied a limited stream of low-cost goods to the world. Now, China has moved into sophisticated manufacturing of critical components and materials for a wide swath of industries. China is the largest exporter of intermediate manufactured goods that can be resold between industries or used to produce other things, so its problems quickly reverberate through global supply chains.

At first look, it may seem some lines can be drawn to circumscribe the potential effects, but consider that most impacts have additional effects that multiply the potential down side:

- **Delivery**: The impact is not just about the workers for manufacturing; it’s about logistics. There are very real issues moving materials by any means. Road travel within China is limited by travel restrictions, and this has put a strain on rail services. Shipping by sea is subject to potential quarantines of personnel or possibly materials, and to port closures, which are complicated by the inability to move materials by road or rail to other ports. Much air travel is suspended, as is the cargo that usually moves on those airlines.

- **Quality**: In-country quality or production monitoring may be impacted. Domestic resources may be unable to return to facilities due to travel restrictions amongst provinces, and travel into the country may be restricted or unwise for others for a protracted period. It will be a challenge to ensure that your production and quality are not suffering even if factories do come back on line.

- **Expense**: There are also legitimate concerns about materials not becoming fully unavailable, but unaffordable. Similar to what we might see happen to plywood, for example, in the event of a hurricane, materials might be available, but at such a premium that it could be extremely hard to absorb versus the original budgeted price. If prices for the scoped materials rise by a multiple, this can cause contracted parties to default if they are overexposed to escalation. It can make downstream partners vulnerable who normally would be fine, and certainly is a risk if those partners’ balance sheets were already showing weakness. This may also affect whether Force Majeure comes into play in contracts. Being unable to afford a material is not the same as being unable to source it, and that may make a difference in legal interpretation.

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- **Timing**: Beyond the cost of the materials, schedule impacts must also be considered. Even once the disease plateaus and the situation starts to normalize, the time to resume manufacturing and shipping could be significant. Identify those activities which may be affected, and associated float or lack thereof. To an extent, schedules can be compressed, but there is a point where that may not be enough, and unique solutions and flexibility will be required from all parties.

Another health impact from this outbreak may well be to the long-term financial health of many of these manufacturing facilities. The health crisis coincides with an especially difficult time for China’s factories, coming on the heels of a 19-month trade war with the United States. Taken together, this could be too great a strain for companies – especially smaller entities – causing them to close altogether.

Whatever the impacts, contractors are wise to take some immediate steps to assess their exposure to resulting supply chain disruption.

**Short Term Steps**
What steps should the construction industry be taken right now to limit damage from potential supply chain disruptions? Immediate actions should be focused on identifying and managing the risks that are emerging.

To come through this crisis well, the construction industry will have to acknowledge and act on the fact that this is a global issue requiring global solutions. A “big room” approach is needed, in which full transparency and mitigation planning occurs openly with all parties who must then work together for success.

The first step should be to assess your exposures via a supply chain audit as a collaborative effort with all partners - owners, builders, subcontractors, and suppliers - to understand potential vulnerabilities. This can seem like an overwhelming task. For initial direction, one option is to start by focusing on materials known to be from China and other affected parts of the world and work your way down. A second option is to start by assessing any subcontractors or suppliers that you know to be particularly fragile financially, and make sure they either are not exposed, or that there is a plan in place to help them weather this storm. For example, subcontractors who already have a financial risk mitigation plan in place may need extra help.
Once the supply chain audit is complete and the risks are identified, act to mitigate issues you find. In some circumstances, you may find a focused risk mitigation plan is necessary; this may be relative to the entity involved or to the materials itself.

If your audit reveals exposure with a downstream entity, revisit their financial qualifications to understand how vulnerable the situation makes them relative to their financial strength. Also assess what you have learned of their character. Some will stand up for their word and reputation and do their best to absorb any financial impacts. Some will not. It's worth understanding who you are in the situation with. This information will help to focus any risk mitigation measures. It is very important to have awareness that all the risk cannot realistically be pushed downstream.

All members of the team need to be involved working for the success of the overall system. A solution that is overly hard on one part of the supply chain will ultimately cause other problems – now or down the road.

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Additionally, alternate suppliers may need to be located and engaged for specific materials. This assessment should include determining if a particular material is specialized or a commodity, if it is widely needed or specific to your project, and whether you can proactively procure the materials through a different supplier and store until needed. If you can proactively procure materials, you may avoid delays or cost escalation.

Your organization may be able to look to the past for lessons learned during similar situations in the past. (SARS, Port Closures, etc.) What came of those events? What strategies have been successful in the past? What tactics do you already have in your tool box that could be applied now? Seek out those who were involved, if needed, and understand how the situation was managed. Apply those lessons as applicable. If your company does federal work in the USA, you may also look to your suppliers that operate under the Buy American Act for potential domestic solutions.

Next time – and there will be a next time - make sure you use today’s pain to lessen tomorrow’s. Capture the strategies that work for future use.

Long Term Actions

In all likelihood, another outbreak or other disruptive event will happen again, and perhaps sooner than we think. Smart companies will emerge from this situation with a pocket full of lessons learned and will hopefully apply those lessons to improve strategy in a way that reduces the impact of these events going forward.

Now is the time to work proactively with all concerned parties and come up with the appropriate strategies. Seek input from all partners and resources because each team member will have unique viewpoints that might otherwise be missed. Ask the project owner, developer, and builder for their perspectives. Particularly, ask your subcontractors what they would recommend; they often have very innovative solutions due to their proximity to the supply chain. Seek input from peer groups, friends in the industry, even your competition. A rising tide really will float all boats if the result is a more resilient supply chain; this is not the time to let competition override collaboration. The entire construction industry needs to make a concerted effort to understand the supply chain of the materials we specify, submit, value engineer, and accept as substitutions for any given project.

Additionally, review your subcontractor and supplier prequalification practices. They should include awareness of downstream parties with a view towards surfacing supply chain vulnerabilities. Important factors are awareness, flexibility, redundancy, financial strength, and the character and reputation that suggests they will truly be a partner in seeking solutions and sharing responsibility for impacts.

Also check in on your Go / No Go process. Is it used to identify your potential supply chain issues and their attitudes towards them? Do your considerations include the design team and whether they are known to specify challenging materials with a single source or origin and their flexibility on these items in the past? Can you understand if the owner or developer is extremely price driven or able to be flexible in situations where a slightly more expensive material or approach could alleviate some supply chain pressure? This type of flexibility will be crucial in any similar future scenario.

Where this event reveals weaknesses, work to use all these strategies to strengthen your business continuity plan (BCP) for future use. Supply chain interruptions can result from many occurrences, including weather events, geopolitical shifts, strikes, or, in this case, a global health event. These events, and the follow-on effects from them, should be contemplated and planned for to the greatest extent possible, and the strategies above may be an important part of your plan of attack. Having a ready BCP can potentially reduce the impact of supply interruptions and define early and critical steps for your leadership team.
Characteristics of a Resilient Supply Chain
There are some common characteristics of resilient supply chains across the spectrum. To make yours more resilient, ask how your enterprise can be more:

Transparent
▪ Know your supply chain – from end to end.
▪ Openly discuss potential issues / exposures with all parties.
▪ Constant Communication and Monitoring

Diverse
▪ Avoid reliance on single sources where possible, build deep relationships where not.
▪ Understand suppliers’ redundancy, favor those who have it.

Flexible
▪ Where risks can’t be avoided, identify and manage them.
▪ Risk Register / SWOT analysis – with the understanding that some measures may seem to be the opposite of “value” engineering, but may be money well spent
▪ Targeted Risk Mitigation Plans
▪ Where possible, consider proactive procurement and build in float for critical / long lead materials

Learning
▪ A learning organization doesn’t just snap back to the same shape after an impact, it learns and grows – deliberately adapting its approach based on lessons learned and potential hazards perceived.

Final Thoughts
There does not appear to be an easy way through this disruption, but your organization can mitigate potential impacts with collaboration, mitigation, and flexibility. Ultimately, this can be viewed as a reminder that we should all be thinking about our supply chains in this highly connected world, and that we are all in it together.