Global supply chains have typically been ignored by content and process technology vendors. And with good reason, as over the past few decades supply chains have been reluctant to ride technology waves and have been comfortable with the status quo. As a result, they still rely heavily on hard copy documentation and associated manual processes to undergird and work around supply chain management software.

The upheaval wrought by COVID-19 has created a situation where executives now view supply chain transformation as necessary. Painful, unexpected supply chain disruptions have highlighted the need for technology that ensures future continuity and mitigates against the impacts of market disruptions. At the time of writing, 75% of US companies report having had their supply chains disrupted.1 Delays and shortages have become commonplace, and many links in the chain have faced temporary or permanent shutdowns while others face skyrocketing demand for products.

Managing through the crisis has proven to be particularly difficult as few enterprises are truly able to track, trace, and analyze – and in turn adapt, optimize, and improve – their supply chains. For now, supply chain participants are doing whatever it takes to keep their chains functioning. Post-crisis, there will be a surge of interest in, investment in, and deployment of technologies such as process mining, digital process management, robotic process automation, Internet of Things (IoT), blockchain, cloud, and information management; these will flow into the supply chain to overhaul outdated processes and mitigate the risk of future market shocks.

Supply chains are not only highly complex, but also typically highly fragmented. Though supply chains for food, pharmaceuticals, manufactured goods, and energy, for example, each have their specific peculiarities, they also have a lot in common. Lessons learned in one industry sector can often be adapted and reused in another. Many of these practices and lessons have been codified and automated within supply chain management (SCM) systems and processes.

The term “supply chain management” came into popular tech parlance in the 1990s, as management consulting methodologies such
as business process re-engineering converged with enterprise business applications such as enterprise resource planning (ERP) and SCM. Together, they launched an era of process automation, reorganization, and staff downsizing. In theory, these late ’90s activities constituted stage one of a massive overhaul of traditional supply chain activities whereby production, distribution, storage, inventory control, and finance were integrated into a single overarching automated operation. In practice, this rarely happened, with many, if not most, activities in the supply chain today running independently.

Though the ERP era did bring about a modernization of sorts, it fell far short of its goals and in the two decades since, little further progress has been made. In short, the modernization and digitization of the supply chain stalled.

**Today’s Technology Landscape for Supply Chain Management**

Today there is an urgent need to bring transparency, efficiency, integration, and agility into supply chains. Fortunately, the technology has advanced a long way since the 1990s. The technological improvements are not so much in the form of improved ERP or SCM systems. Rather, they are in the ability to tackle the underlying problems and gaps inherent in traditional ERP and SCM systems. For example, significant gaps exist in these areas:

- Digitizing labor-intensive, inefficient, paper-based processes
- Leveraging business insight from data analysis and process intelligence
- Bridging key collaborative elements within supply chains

**Figure 1**
*The supply chain of the 1990s*

- Inflexible enterprise apps
- Limited data insight
- Manual workarounds
- Physical documents and forms
- Email intensive

**Figure 2**
*The supply chain of the (near) future*

- Robotic process automation
- Document management
- Intelligent capture
- Predictive analytics
- Process mining
- AI/ML
- IoT
- Contextual collaboration
Digitizing paper-based processes

The supply chain paper burden is immense, with dozens if not hundreds of hard copy documents often associated with transportation, quality assurance, and billing. For example, managing the production and movement of a product (think cherries from a midwestern farm, cod fished in sustainable waters, or olive oil from Italy) is a slow, paper-intensive, and expensive process, and one also riddled with errors. Though the technology exists to digitize and automate many, if not all, of these hard copy documents, from bills of lading to invoices, it is rarely used.

Leveraging data analysis and process intelligence

Supply chains produce thousands of data points, and with the increased use of IoT devices for track and trace, the number of data points is set to increase exponentially. Supply chain data is some of the richest business data available, yet in an era of big data, machine learning, analytics, and artificial intelligence, the data is typically poorly managed and rarely leveraged effectively.

Bridging collaborative elements within supply chains

Supply chains are by definition interconnected links between suppliers and third-party agencies, be they producers, storage and transportation, or end users and retailers. Bridging the gaps between each link, sharing information, and collaborating to ensure the smooth flow of goods and services is essential. Yet technology alone has been insufficient to manage these links. Rather, enterprises operate through established trusted relationships. For example, though an IT system may say that X amount of inventory is in stock, or that the goods have now arrived at location Y, without these relationships in place few will trust the system and parties will instead verify the situation manually.

Crisis-based Change

With the advent of COVID-19, not only is the healthcare system in the throes of managing an overwhelming, relentless demand for medical care, but also the nation’s supply chain systems are under extreme pressure to deliver urgently needed goods in record time.

Scrutinizing these problems reveals that it isn’t just one, two, or three pressure points causing problems. Digital (and still often manual) supply chains are working in hyperdrive to provide much larger than normal shipments through supply chains that are experiencing whipsaw changes as new needs arise and certain industries (e.g., retail) shut down. And the blame for delays and shortages doesn’t lie completely at technology’s feet, because the inter-enterprise supply chains have been working the way they should under normal conditions. But this is an abnormal time in our history.

Digital (and still often manual) supply chains are working in hyperdrive to provide much larger than normal shipments through supply chains that are experiencing whipsaw changes as new needs arise and certain industries (e.g., retail) shut down.
Take the food distribution supply chain system for example. The problems are myriad and extremely hard to address in real time, such as:

- **Worker illness reduces capacity.** The meat-packing industry is running at 75% capacity at the time of writing because two processing plants closed due to the virus, and capacity may decline even more as additional plants are impacted.³

- **End-point distribution centers are closed.** The widespread closure of restaurants and schools, for example, has led to radically different demand curves than in normal times (e.g., beef processors are unable to find sufficient grocery store customers for high-end steak cuts that would normally go to upscale restaurants, while the demand for hamburger is sky-high).⁴

- **Workers are afraid to show up.** Workers at some food production plants are staying home because they either fear getting sick or already are. This is also true in the grocery store chains.⁵

- **Migrant essential workers face additional pressures.** Migrant worker absences could lead to unharvested produce fields and fruit orchards this season. Many of these migrant workers are undocumented and uninsured, plus they often live in crowded conditions conducive to spreading the virus. Workers who received visas and routinely crossed borders in the past may not be allowed to do so this year. Growers fear that the migrant labor force will not show up in needed numbers when it's time to harvest.⁶

As Figure 3 illustrates, many of the nation’s supply chains work well under normal conditions. But they go haywire when:

1. the workforce is severely disrupted
2. consumption patterns change overnight
3. distribution channels open up or close down (or both) with little notice
4. demand increases more quickly than anyone could have forecast
A key takeaway is that technology is not the only problem – other economic factors are creating relentless pressures on suppliers, buyers, and government agencies that would not normally be involved. However, some lessons learned from this pandemic show how different technologies can improve outcomes during a time of crisis.

Moving Forward

Even during the COVID-19 crisis, business technology leaders can take actions to alleviate at least some of the pitfalls in supply chains that are facing increased (or reduced) demand, changing distribution channels, and worker shortages. Here are some examples:

→ Use process mining to find insights into newer, better, and faster ways to work in the midst of disruption. Uncover real-time process execution issues by using process mining tools to analyze core processes for root causes – seeking insights to where the deviations lie, the causes for delays, and factors driving costs higher. Process mining can be used to great effect for increasing business agility by analyzing and streamlining work processes going through CRM, ERP, and digital process automation systems.7

→ Get a “SWAT” team to identify wasteful work activities. For example, unautomated work activities that were tolerated or ignored before the pandemic now often strain the virtual workforce. This includes dependence on paper forms, physical mail, and manual workarounds for handling exceptions. Find your Six Sigma black belts and Lean practitioners and put them to work on increasing supply chain agility and eliminating operational friction.8

→ Use agile approaches to quickly implement low-code case management (including document management, digital decisioning, and digital process automation). This can automate or eliminate manual steps, activities, and processes while also eliminating physical documents that clog the system. Case management provides a way to change the entire business process quickly using low-code tooling and digital decisioning, and it routinely supports handling process instances that take different paths to completion.9

→ Go further by using robotic process automation (RPA) to automate many of the time-consuming, wasteful activities that support the holistic execution of enterprise applications such as ERP, SCM, and CRM. Many of these manual tasks will surface as deviations from the norm through process mining and/or when the SWAT team reviews business processes. Some of them (whether attended, unattended, or both) may be temporary solutions that help to bridge the performance gap during extreme disruption to supply chains and other processes.

→ Explore the use of blockchain to create shared and trusted supplier networks. Enterprise blockchains provide the means...
to distribute a single version of the truth and ensure the need for only a single shared copy of an invoice, bill of lading, delivery note, or manifest throughout the chain. Industry consortiums and government bodies are actively working to build standards and procedures to leverage blockchain to reduce errors and to speed up slow and costly activities like customs clearance in import and export.

**Digitize your paper**, as well-proven and low-cost technology is available today to capture, share, and secure paper documents and to provide anywhere, anytime, any device access to those documents. First-generation systems requiring specialized hardware and form-building software have been superseded by mobile-friendly cloud-based services. Focus on intelligent capture to speed the input of high volumes of documents.

**Contextualize collaboration.** Many organizations deploy the latest collaboration and document-sharing tools by tossing them into the work experience and expecting employees to figure out how to integrate them into their work styles, tasks, and activities. Instead, contextualize these tools so that they are fully integrated into the supply chain process. This will reduce operational friction and provide greater value from collaboration tooling. And as this crisis has shown, make sure employees can readily and quickly use these tools from home or other remote locations.

**Get your best and brightest leaders and senior managers working on “disruptive” change management.** For several years, adaptive change management has been embraced by visionary business leaders and operational managers because the methodologies work during uncertain times. But now, much of the workforce has gone virtual and it will be hard to change this way of operating when the pandemic subsides (particularly if the virus returns in the fall, as many epidemiologists and virologists predict). Aligning leadership vision and managerial competence to guide the workforce through massively disruptive changes in ways the business has never done before will be essential for operating in the new “normal.”

**Consider the use of machine learning and artificial intelligence.** Though the popular press likes to talk about AI as a big and scary thing, in the real world most enterprise AI is small, low-cost, and easy to deploy. Look for pre-packaged AI products that can (for example) automatically read documents with remarkable accuracy and extract information and data.¹⁰

**Take another look at the IoT.** The reality is that IoT sensors that can track light, humidity, location, barometric pressure, and movement (in some cases all within the same device) are a commodity today. Some of the most advanced sensor technology costs under $10 a piece, includes RFID capabilities by default, and can deliver extremely deep, accurate, and relevant information.
Don’t rip and replace. At Deep Analysis we would never recommend an immediate overhaul and the ripping and replacing of existing systems and procedures. Though such an adventure may prove very lucrative to an IT or consulting firm, the results can be disastrous for the recipient. Instead we strongly recommend that you start small but think big. Look for small, incremental fixes to your existing supply chain activities, experiment locally with new technologies and approaches, and see what works and what doesn’t. But do think big, have a long-term strategic goal for automation and optimization, and work step-by-step toward achieving that goal.

Call to Action

Many organizations’ supply chain management systems still rely on paper-based processes. While this has made them unable to respond quickly during the current crisis, it also means they are unencumbered by complex legacy applications and their associated workflows. Ironically, this makes them ideal candidates to leapfrog businesses in other sectors and enact strategically ambitious digital transformation projects.

The challenge and disruption presented by COVID-19 can also be viewed as an opportunity for organizations to improve and update their supply chain management capabilities with digital technologies. We encourage you to consider the ideas presented in the previous section and move forward with any that will help in the current situation as well as during any future disruptive events.

Endnotes

1 Institute of Supply Management, March 2020, see https://fortune.com/2020/03/11/75-of-companies-report-coronavirus-has-disrupted-their-supply-chains/


4 Ibid.

5 See https://www.today.com/food/meat-factories-are-shutting-down-across-country-will-there-be-t178527


7 See our report, “Process Mining & the Lost Art of Continuous Improvement” at https://www.deep-analysis.net/2020/03/process-mining-the-lost-art-of-continuous-improvement/


About Deep Analysis

Deep Analysis is an advisory firm that helps organizations understand and address the challenges of innovative and disruptive technologies in the enterprise software marketplace.

Its work is built on decades of experience in advising and consulting to global technology firms large and small, from IBM, Oracle, and HP to countless start-ups.

Led by Alan Pelz-Sharpe, the firm focuses on Information Management and the business application of Cloud, Artificial Intelligence, and Blockchain. Deep Analysis recently published the book "Practical Artificial Intelligence: An Enterprise Playbook," co-authored by Alan and Kashyap Kompella, outlining strategies for organizations to avoid pitfalls and successfully deploy AI.

Deep Analysis works with technology vendors to improve their understanding and provide actionable guidance on current and future market opportunities.

Yet, unlike traditional analyst firms, Deep Analysis takes a buyer-centric approach to its research and understands real-world buyer and market needs versus the “echo chamber” of the technology industry.

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