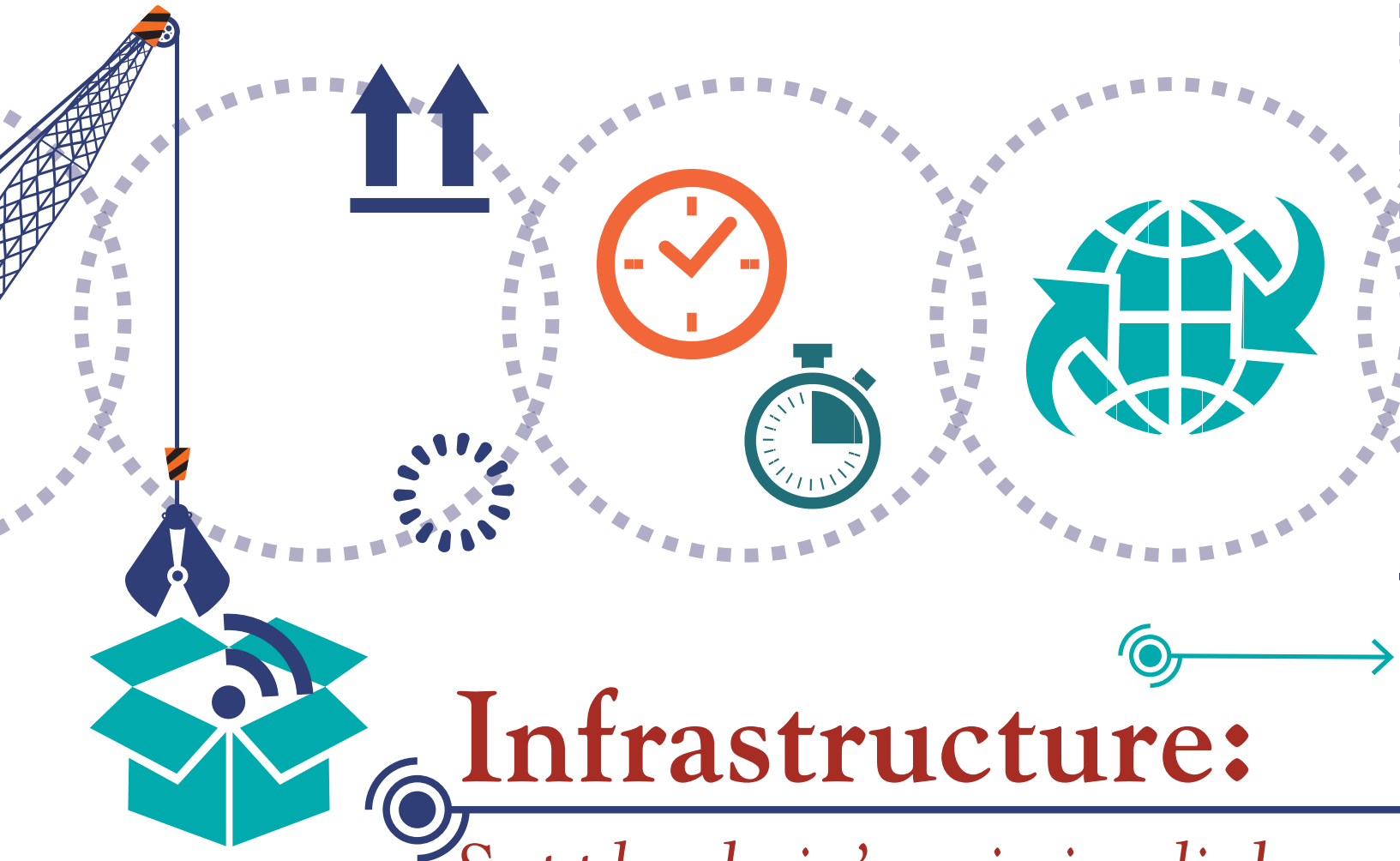
CSCMP's
Supply Chain
[QUARTERLY]



# Infrastructure:

## *Supply chain's missing link*

Companies that fail to take a holistic view of infrastructure—the physical and informational assets required to run a supply chain—sometimes make capital-investment decisions that are detrimental in the long run.

**NOT LONG AGO,** the consumer goods giant Unilever conducted a study that identified all the ways in which the company could reduce its supply chain expenses without adversely affecting customer service. The results revealed that 80 percent of the potential savings were locked up within the physical infrastructure of Unilever's network. This meant that only 20 percent of the potential savings could be achieved without having to move and/or significantly re-engineer the company's factories and distribution centers.[1]

Those findings—and the fact that they garnered so much attention across the industry—serve to highlight a glaring omission in the way most of us think about our supply chains: the role of infrastructure. Search for definitions of the term *supply chain*, and you'll notice a common thread among the descriptions of what is being managed. Here are just three examples:

- *The Council of Supply Chain Management Professionals (CSCMP):* "All activities in sourcing, procurement, conversion, and logistics…"
- *Massachusetts Institute of Technology:* "The movement of raw materials into an organization, the internal processing of materials into finished goods, and the distribution of finished goods to the end consumer."
- *MacMillan Dictionary:* "A series of processes involved in supplying a product to someone."

Notice that these definitions all focus on movement, activities, and processes. As a result, they overlook a fundamental component: the infrastructure required to support the movements,

[BY CHARLES FALLON]

CHARLES FALLON (CHARLES.FALLON@LIDD.CA) IS A PRINCIPAL WITH THE CONSULTING FIRM LIDD SUPPLY CHAIN INTELLIGENCE.

activities, and processes that occur throughout the supply chain. No supply chain activities can take place without infrastructure. Moreover, as the Unilever study shows, infrastructure has an overwhelming impact on how effective or costly those activities can be.

In this article, we'll define supply chain infrastructure and identify its key characteristics. We will also explore some of the most common and costly mistakes made by companies that do not understand their supply chains in terms of their infrastructure. Finally, we will set out a process that supply chain managers can use to get their company's infrastructure under control and ensure that it is serving the true needs of their business.

## A definition of supply chain infrastructure

Supply chain infrastructure consists of both the physical and informational assets required to run a supply chain. This includes the buildings in which a company manufactures and distributes its products; the fixed and mobile equipment inside those buildings; the transportation fleet that moves product within the manufacturing and distribution network; and the information technology needed to plan, execute, and track supply chain activities.

Without reference to these assets, standard definitions of "supply chain" are substantively lacking. Building locations define the movements of products within a supply chain. Material handling systems determine the activities required to process and distribute goods—and whether those activities are efficient or not. Information technology (IT) systems enable and constrain the supply chain processes that a company deploys. These assets will largely prescribe a supply chain's cost and service outcomes.

Assets consume a company's available capital—that limited, precious resource for which all areas of the corporation compete—and decisions about how to invest that capital must be made. For example, should a company build new stores, or retrofit the distribution center? Should it acquire a small competitor operating in a different market, or should it install a new transportation management system? Many supply chain professionals don't deal with such stark contrasts, but they should understand how upper management views such choices: Every dollar of capital that the supply chain consumes is a dollar of capital that cannot be spent on projects that could potentially be more beneficial to the company.

Conversely, starving a supply chain of capital results in a creeping escalation in operating costs, a decline in customer service levels, and the eventual weakening of a company's position in the marketplace. This happens because the supply chain infrastructure loses its capacity to sustain the company's volume of business, and expensive "temporary fixes," such as overtime or outside storage, become permanent fixtures in the operation.

> Supply chain infrastructure consists of both the physical and informational assets required to run a supply chain.

The assets that make up supply chain infrastructure have other important characteristics:

**1. The value of infrastructure depreciates.** The rates of depreciation vary based on the asset class in question. Buildings retain their "book value" 20 to 30 years after construction has been completed, while IT investments lose all their value anywhere from three to seven years following an implementation. Even a stable supply chain, with no change in volume or character, requires a reinvestment of capital into its infrastructure just to replace assets that have exhausted their useful life. However, that reinvestment is infrequent enough that the average supply chain professional is likely a novice when it comes to properly defining a supply chain's infrastructure needs and navigating the investment process. If a mistake is made during this investment cycle, it could take years, and perhaps decades, to correct that mistake.

**2. Infrastructure deteriorates physically.** Facilities, equipment, and IT systems require regular maintenance to keep them operating efficiently. This means incurring operating expenses to perform routine functions like repairing packaging lines or fork trucks, or a small injection of capital on a regular basis, to replace a lighting system or upgrade to the latest version of software, for example.

**3. Infrastructure can be owned, leased, and/or operated by a third party.** It doesn't really matter who owns a particular asset within a company's supply chain infrastructure; there are myriad reasons to own or not own, and to control or not control supply chain assets. What does matter is that, when looked at as a whole, the decision determines how effectively (and at what cost) a supply chain operates. For instance, having a distribution network operated by a third-party logistics services provider

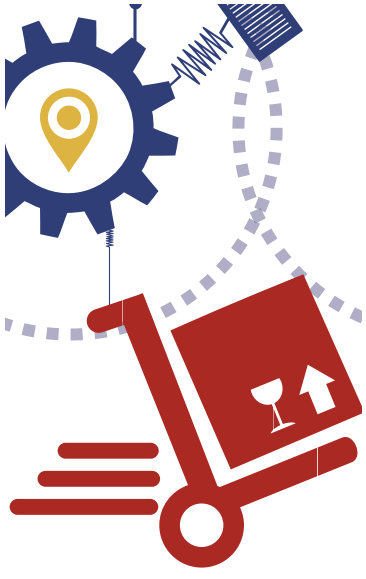
(3PL) does not mean the infrastructure is solely the 3PL's problem, as the operator will pass on any operating penalties from infrastructure deficiencies to its customer in the form of higher costs. This is particularly true in the age of cloud-based software solutions, where applications reside on far-distant servers accessed via the Internet.

## The dangers of scattered responsibility

Too often, companies fail to look at their supply chain assets as a single, cohesive infrastructure. Instead, they scatter responsibility for individual elements across different departments within their organization. This approach inevitably causes the supply chain to suffer some classic failings. Do any of the following sound familiar?

**Operating in "silos":** Finance controls IT, and operations controls facilities and equipment. Each department makes decisions in a vacuum, sometimes at cross-purposes, and sometimes overcompensating for perceived underinvestment on the part of other departments.

Here is a real-life example of the potential consequences of this all-too-common disconnect. During a tour of a bedding manufacturer's principal distribution center, the director of warehousing explained that a new warehouse management system (WMS) would be implemented in a few months. When asked how the new software would affect day-to-day operation, he responded that he didn't know. "It's a finance project, and I haven't yet seen the application, but they tell me it's got everything on our wish list."



The fact that he was uninformed about the details of the new WMS was surprising—and a warning signal of potential problems. At the time, the facility's conveyor system, racking system, and product slotting were the subject of a fairly extensive re-engineering project. The warehouse control systems (WCS) that operated the conveyor system were managed by operations, and the project team was contemplating a number of upgrades to that software's functionality. Depending on the capabilities of the new WMS, however, those changes might have been excessive, contradictory, or even unnecessary. Without intervention, investments made in both systems would have been redundant, resulting in a complete waste of capital.

**"Sore tooth syndrome":** Companies often consider making capital investments in infrastructure only after capacity constraints begin to limit growth and/or disrupt customer service. We often refer to such behavior as "sore tooth syndrome." Much like a person who waits until a tooth becomes painful to visit the dentist, some companies react to infrastructure deficits only when they become a problem, instead of identifying them and planning or developing solutions before they happen. In this environment, companies typically are under pressure to solve a problem quickly, which often leads them to make shortsighted capital-investment decisions.

To understand this point, consider the case of a foodservice distributor that was operating three distribution centers (DCs) in the U.S. Midwest. Its flagship distribution center had reached capacity in the freezer and ambient departments, thereby affecting its ability to serve major chain-store accounts. In response, the company launched a rapid expansion project for that facility. However, there was another alternative management failed to consider before embarking on this expansion: shifting volumes from the flagship distribution center to a second DC that had sufficient capacity to handle the overflow.

To accommodate a shift in volumes, the distributor would have had to make minor modifications to the second DC's layout. It also would have incurred additional transportation expenses of just over US $100,000 due to an increase in the delivery miles across the network. The facility expansion, however, cost several million dollars; it would take 25 years of the additional transportation penalty to offset the amount of capital sunk into the expansion. Clearly, the distributor was quickly reacting to a "sore tooth" and did not spend time thinking through all its infrastructure options.

**"Missing links":** Companies sometimes make the mistake of scattering responsibility for the various assets that make up their supply chain infrastructure across multiple departments and divisions. They do not have a single, coherent vision of their entire supply chain, and as a result, they fail to recognize when something is missing from their supply chain infrastructure. The most frequently encountered "missing link" results from not viewing information

technology as a vital part of that infrastructure, as the following example illustrates.

A 3PL handled the distribution of consumer electronics to retail outlets for several manufacturers. This required highly accurate asset-tracking capabilities, so the 3PL installed a WMS in two distribution centers to manage the receiving, device configuration, and shipment to retail locations. It also managed reverse logistics, in which devices were returned from the stores for repair, reconfiguration, or disposal.

Despite the WMS installation, inventory accuracy was still well below the customers' expectations. To find out what was wrong, the 3PL launched a complete audit of the consumer electronics operations.

It turned out that the problem was not the WMS. It was the warehouse layout and corresponding storage locations. There were too few locations to meet the customers' inventory requirements, and these locations were too large. As a result, when the warehouse crew put inventory away, they were commingling different types of items in individual locations. Then, when order pickers pulled inventory from those locations, they were making errors because they had to sort through different items to get the product they were directed to pick. An inappropriate racking system design made the WMS less effective than it should have been. The solution to the inventory-accuracy issue was re-profiling the racking to ensure that the DCs always have the right-sized inventory locations for the individual inventory instances, and then letting the WMS do its work.

**"Drunken sailor" behavior:** Too often, companies are led down a path of excessive capital spending by thinking that each individual project will be the opportunity to solve every supply chain problem. Convinced that the "breakthrough" automation technology they read about in a magazine or saw at a trade show will be the solution to some bigger problem, they may end up spending money on infrastructure improvements with abandon—"spending like a drunken sailor," as the saying goes. Although any spending on supply chain infrastructure may sound like a good idea, excessive spending can create problems elsewhere. That is, when supply chain infrastructure consumes too much precious capital, critical demands for capital in other areas of the business go unfilled.

That is what happened to one food manufacturer

## [FIGURE 1] CREATING A BASELINE FOR SUPPLY CHAIN INFRASTRUCTURE

Supply chain infrastructure should be developed over time in accordance with a company's vision of its entire supply chain, rather than through reactions to individual events or situations. The first step in long-term planning is to create a baseline inventory, using the following process:

**A. Construct an inventory of infrastructure assets**

- Compile information about all facilities, equipment, and IT applications within the supply chain.
- Characterize each asset in terms of its economic life, as well as the location and function of each within the supply chain.

**B. Profile the flow of goods and human resources through the supply chain**

- Characterize the physical assets in terms of capacity utilization.
- Evaluate labor productivity, service levels, and inventory accuracy.
- Perform an activity-based costing exercise to understand the operating expenses associated with flowing volumes through these assets. Activity-based costing is the exercise of assigning operating expenses to specific activities, such as picking orders or manufacturing finished goods.

[SOURCE: LIDD SUPPLY CHAIN INTELLIGENCE]

that was planning an expansion of its finished-goods warehouse. Having seen automated storage and retrieval system (AS/RS) cranes in one of his customer's distribution centers, the food manufacturer's chief executive officer (CEO) contacted the equipment maker to learn more. Through discussions with the equipment manufacturer, the CEO became convinced that a multimillion-dollar investment in AS/RS cranes should be integral to his expansion plans.

He knew that his wage rates, even when benefits were included, did not come close to the threshold required to provide a solid payback based on labor reductions. Instead, he justified the AS/RS investment based on the fact that the system would track inventory and therefore eliminate his company's product-rotation and inventory-accuracy problems. But those problems could have been eliminated with a much smaller investment in an appropriate warehouse management system. In short, the CEO was planning to spend millions of dollars on robots when the real benefit he was seeking was in the software that managed those robots.

## The value of "continuous evolvement"

A company's supply chain infrastructure changes very slowly over time due to the lifecycle of the assets involved. Year after year, individual assets are expanded, upgraded, and replaced such that, as a whole, the infrastructure evolves. If that evolution happens in accordance with a holistic vision of the entire supply chain—rather than through *ad hoc* reactions to individual events or developments—then a company will have every opportunity to avoid the failings outlined above. It will also have the opportunity to improve its cost and service effectiveness with each investment decision it makes. We call this approach "continuous evolvement."

Continuous evolvement starts with a clear, coherent baseline of a company's supply chain infrastructure. Creating that baseline involves two main actions (briefly summarized in Figure 1).

The first is to ***construct an inventory of infrastructure assets.*** This requires two steps:

- Compile information about all facilities, equipment, and information technology applications within the supply chain.
- Characterize each asset in terms of its economic life, as well as the location and function of each within the supply chain.

The second is to ***profile the flow of goods and human resources through the supply chain.*** This effort comprises three steps:

- Characterize the physical assets in terms of capacity utilization.
- Evaluate labor productivity, service levels, and inventory accuracy.
- Perform an activity-based costing exercise to understand the operating expenses associated with flowing volumes through these assets. Activity-based costing is the exercise of assigning operating expenses to specific activities in the supply chain, such as picking orders or manufacturing finished goods.

Too often, companies fail to look at their supply chain assets as a single, cohesive infrastructure. Instead, they scatter responsibility for individual elements across different departments.

Profiling product flows and human resources is a critical part of developing a baseline for supply chain infrastructure because these elements inform the key performance indicators (KPIs) that tell managers how well their supply chains are operating. Low labor productivity or poor service levels are symptoms of bad infrastructure. Without these benchmarks, an accurate assessment of the current infrastructure is not possible.

Note that for very large, multinational organizations, this exercise may quickly become unwieldy. In these instances, the effort should be focused on individual business units or geographic regions, where supply chains are largely independent.

With the baseline complete, the next step is to project operating requirements for five to seven years out. These must be defined in terms of increases or changes in order volumes, product variety, lines of business and/or markets, customer service levels, and inventory management practices. Understandably, the task of trying to project what a business will need five to seven years from now may seem daunting, if not impossible. However, the time frame for implementing new infrastructure is long (realistically speaking, constructing a new building is a 24-plus-month project). Using a shorter planning horizon, therefore, would mean putting in place assets that are near obsolescence almost as soon as they come on stream.

These projections are set against the infrastructure in order to develop a five-to-seven-year capital-investment road map for all infrastructure, including facilities, equipment, and information technology. The road map should consider all major investments (for example, facility expansions or new IT applications) as well as minor investments (replacing aging mobile equipment, for instance).

Simply going through the exercise of building a comprehensive infrastructure road map will tear down silos that might exist, as everyone responsible for the various assets under consideration will have to collaborate to create that single, all-encompassing plan. Moreover, as the road map takes shape, members of the executive management team will begin to see missing links in the company's infrastructure. They will see how weaknesses in IT capabilities impact decision making in facilities and equipment—or the opposite: that past IT decisions were made to compensate for bad material handling systems and facility layouts.

As different parts of the company or external parties propose new capital investments, it's important to always ask, "How does this fit into our infrastructure road map?" If it doesn't fit into that long-term, holistic plan, then don't make the investment.

Unilever has reinforced that point with the findings in the report mentioned at the beginning of this article. The global consumer goods manufacturer learned that substantial changes in supply chain costs and service levels would only be made possible through a restructuring of its supply chain infrastructure. For any company, recognizing this fact is the first step toward creating a culture of continuous evolvement, in which every capital-investment decision meets the objectives set out in a company's infrastructure road map.

Unilever understands this, and it is no coincidence that the research firm Gartner has ranked it number 4 in its annual report listing the 25 best supply chains in the world. In fact, the top 10 companies on Gartner's list, including Amazon, Wal-Mart Stores, and McDonald's, all think very carefully about their supply chain infrastructure and commit capital only to those investments that serve their infrastructure goals. Any company that wants to achieve world-class financial and service performance should follow their lead. △

**Notes:**

1. Dan Gilmore, "Insights from Unilever's Perfect Logistics Network Exercise," *Supply Chain Digest* (July 24, 2014) http://www.scdigest.com/assets/news/14-07-24.htm.

LIDD
SUPPLY CHAIN
INTELLIGENCE

www.lidd.ca ■ 514-933-8777