Tracking the Value of Traceability

By Alexis H. Bateman

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The ability to track and trace products is fundamental to sound supply chain management. Traceability affects supply chain efficiency, product safety and security, managing deep tier risks, on-time delivery performance, troubleshooting customer issues, controlling costs, and regulatory compliance.

Now, another set of demands can be added to this list: government and consumer pressure to meet sustainability goals. Most industries—but especially consumer-facing ones such as food—are experiencing this pressure, and key to their responses is effective supply chain traceability.

However, while these demands are increasing and are extremely dynamic, traceability technology is confusing and, in a number of respects, behind the curve. Innovative solutions are being developed, but companies often struggle to justify investments in the technology.

Companies need to change the way they evaluate supply chain traceability to make the right investments, and to mitigate the risks of missing their sustainability goals and suffering reputational damage in the event of a supply chain failure.

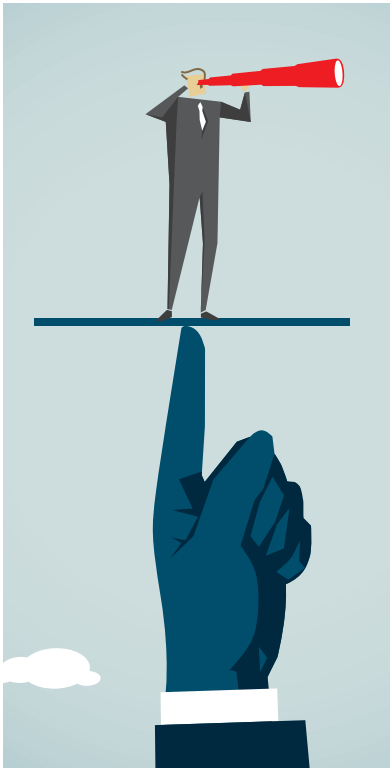
No Clear Path

At a recent roundtable on supply chain visibility held at the MIT Center for Transportation and Logistics, one shipper seeking to improve traceability in their supply chain commented that there are "many fragmented players, different technologies, lots of choices, and no single standard." These sentiments capture the problems that often frustrate the adoption of effective traceability solutions.

In a typical scenario, materials and products are traced only at certain phases of the supply chain, and data is not communicated effectively between trading partners.

Such issues have long been a cause of frustration, particularly in the use of data to both pinpoint operational inefficiencies and support risk management programs. Now they are becoming intolerable, as corporate sustainability efforts come under increasing scrutiny.

Recent controversies over the mislabeling of fish, deforestation resulting from the growth of palm oil plantations, and scandals over the use of forced labor in supply chains are just a few examples of the pressure that companies are under to improve the integrity of their supply chains.



At the same time, the number of initiatives appears to be growing exponentially. The Marine Stewardship Council's fishery sustainability standards that help verify the integrity of seafood shipments is one of many such initiatives. Research underway at the MIT Responsible Supply Chain Lab is looking at initiatives across many industries such as palm oil, fish, coffee, and cocoa, and the challenges of deciding which approaches are the most suitable and cost-effective.

Supply chain traceability informs companies

about their materials and products. Yet, companies often struggle to evaluate the mix of solutions available, and are deterred by the lack of a clear ROI.

Many Options

Various technologies are available to trace materials and products along the chain. The most common ones are alphanumerical codes, bar bodes, RFID tags, and GIS. Depending on the product and needs of the company, technologies are selected based on the product and production processes, and levels of automation in the supply chain.

Alphanumerical codes are inexpensive but require human resources for code writing and data input. Bar code systems—the most frequently used tracing technology—offer high levels of automation and are economical, but require manual screening that leaves room for error. RFID tags, long hailed as the future of product traceability, track materials in real time with precision and no manual intervention. However, the cost of tags is still prohibitive in many applications. GIS is similar to RFID, but the technology uses radio signals that are collected by satellites or cell phone antennas as opposed to radio tag signals.

While many of these tools are in place in certain phases of the supply chain, often information collected at each point is not translated across the chain between actors. Consequently, data management is carried out in silos, which leads to a fragmented view of the supply chain. In many cases the problem is not so much a lack of data, but that data becomes stranded in internal systems. Moreover, tracking data is often limited in scope, inappropriate for a company's needs, or mismanaged. The need to provide additional data to support sustainability objectives adds more complexity.

Some of these challenges are being addressed. There are bolt-ons to existing ERP systems, standalone solutions, and hybrid systems that improve certain aspects of traceability. Still, there is a general lack of standardization, and companies continue to find it difficult to mine and manage the flood of data available to them. And, most of the information is limited to location, which does not inform companies of impending risks or provide sufficient decision-making support.

A technology that could leapfrog many of these issues and transform supply chain traceability is blockchain, the computing system behind Bitcoin. Because the information generated in a blockchain system is crowd-sourced, competing or conflicted actors can cooperate because no one organization has control of the information.

The blockchain computing system creates an encrypted record of a transaction and sends it out to all other nodes in the network. In supply chains this means serial numbers, barcodes, or tags representing physical goods in the system. Once sent, the nodes perform complex cryptographic calculations on the data record and verify the "block" of transactions as legitimate. After the nodes agree that a "block" is legitimate, it is added to a ledger that then serves as the next version of cryptographic calculations for future transactions. In this way, the transactions or exchanges are continually being extended and verified collectively. This is important because through verification of other nodes, the system is resistant to fraud.

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Even blockchain has drawbacks, however. The security and reliability of a network is reliant on the size or the number of nodes involved. The technology is ideally suited for applications in complex supply chains, but less so where there are relatively few actors.

Organizations such as Provenance have been the first to offer this type of system for supply chains with testing the ability to trace T-shirts to Africa and tuna to Indonesia.

Navigating the Technology

Given the uncertainties described above, companies can find it difficult to choose solutions for improving supply chain traceability that meet their needs. Here are some pointers that help to clarify the selection process.

- **Changes in the demand for traceability require different approaches to evaluating the technology.** Consider the value as well as the cost of systems. Try to quantify the benefits in key areas such as inventory management, operational efficiencies, business intelligence, and brand protection.
- **Having estimated the value, don't be deterred by assumptions that the cost will outstrip the ROI of these investments.** For example, a survey published in 2005 by Agriculture and Ari-Food Canada found that 60 percent of respondents in the dairy processing industry felt that the costs outweighed the benefits of trace-

ability systems. Consider the long view rather than focusing exclusively on short-term costs.

• **Avoid action paralysis.** Incorporate traceability into your risk management strategy, and your strategies for brand protection and quality control. Include all relevant departments in the formulation of the business plan.

• **Leverage the company's existing resources.** Often, there is a wealth of unused data that can provide a solid starting point for improving traceability.

• **Look to supply chain partners to build relationships for data sharing** and assessing complementary tools that enhance visibility.

• **Don't get hung up on finding the perfect solution that gives 100 percent traceability—there isn't one (yet).** And don't be afraid of being an innovator.

• **First movers are often the biggest winners** and others will follow suit, bringing economies of scale.

• **Pay particular attention to data collection.** Find the gaps and identify tools to close the gaps. Achieving better information will bring early wins. However, even the best technology and tools need strategic human intervention in the implementation phase.

• **Efforts to advance traceability will fail without collaboration with trading partners and other entities including competitors and industry associations.** Past initiatives such as the Electronics Industry Citizen Coalition (EICC) that focused on conflict minerals underline this lesson. Find the overlaps—companies generally face very similar challenges—and create win-wins.

Value Judgment

Although the path to improved supply chain traceability is not clear, the need to achieve improvements in this area can only increase. And the reasons for putting off investments in the technology are becoming less convincing.

The Responsible Supply Chain Lab has identified several critical benefits of investments in traceability. For example, companies can verify the integrity of their supply chains with data. The data also makes it easier to evaluate and participate in related initiatives to certify products, inform sustainability reporting, and create media outreach programs. Also, having a clearer picture of product movements reduces risk by making supply chains more transparent. ○○○