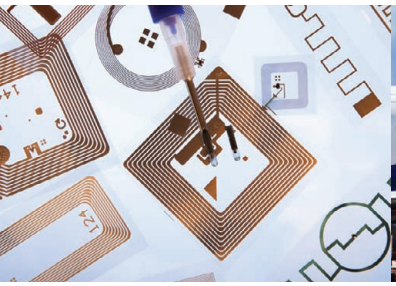
BIG DATA IN THE SUPPLY CHAIN





HOW COMPANIES ARE USING DATA TO EXTRACT ACTIONABLE INSIGHT TO OPTIMIZE THEIR SUPPLY CHAINS







Prior to investing resources into "big data" systems, software and people, firms must understand that data aggregation alone is insufficient. Without a well-thought-out strategy, big data projects can result in confusion between teams, or worse, lead to sunk costs. To assist supply chain leaders in crafting a big data execution strategy, this article uses three examples to illustrate data-driven improvement opportunities in transportation, warehousing and network design. It is highly recommended that supply chain leaders clearly define goals before embarking on a big data project. The ultimate deliverable of data-oriented efforts should be greater transparency in decision making.

WHERE IS BIG DATA IN THE SUPPLY CHAIN TODAY?

Most supply chain leaders would agree that customers are more empowered than ever before. As economies continue to globalize and expand, most industries have a wider range of vendors to buy from, increasingly complex service requirements and constant pricing pressure. Supply chain leaders in particular are faced with acute trade-offs when making both strategic and transactional decisions. For example, is it more profitable to serve customers by shipping via air or ocean? Should we postpone shipments to create a full container, or ship direct with a partial container? How many distribution centers are needed to balance customer service demands with costs?

Supply chains today are faced with the dual challenge and opportunity of what many vaguely refer to as "big data". The opportunity is that big data can enable better and faster decision-making and create new sources of efficiency. The corollary challenge is that big data is fundamentally derived from interactions among people, machines, applications and systems. Sourcing, organizing and analyzing such disparate information are inherently difficult. To extract meaningful and repeatable insights, companies must invest in talent, management systems and of course, technology. Examples of how companies organize and aggregate data include Barcode, RFID (Radio Frequency Identification),Track and Trace Applications, EDI (Electronic Data Interchange), OMS (Order Management Systems), CMS (Carrier Management Systems), Electronic POS (Point of Sale),YMS (Yard Management Systems), and so on.

Seen in the light of existing systems in place, many companies have already invested large sums of money and resources into "big data." Some of these investments were made simply to keep





up, while others may have been made to meet yet unfulfilled promises. But data aggregation alone is insufficient, and is in fact only the first step in a long process. Highly effective supply chains will look at big data as a series of incremental opportunities and not as a single project or one within a functional domain. In fact, as The Economist has noted, big data's "unspoken secret…is to identify the right combination of tweaks capable of bringing about marginal changes that, when multiplied by a huge number of instances, or allowed to work over a long time, produce a significant effect."[1] Indeed, the success of even a medium-sized company's operations is the sum of hundreds of thousands of decisions and transactions.

1. Which areas are the most ripe for improvement and what would be the benefits?
2. What information is needed to make a decision and value the benefits?
3. What data are needed to make a decision?
4. How can the organization turn data into information to make a decision?



THREE DATA-DRIVEN IMPROVEMENT OPPORTUNITIES

Most change-minded leaders will concede that tremendous improvement opportunities exist across their supply chains. Execution is more often the barrier to value extraction than opportunity identification. To help supply chain leaders craft a big-data execution strategy, three examples illustrate the possibilities and demonstrate how other firms have extracted value from their supply chains' data:

1. "Little things that mean a lot," The Economist, 19 July 2014

– **Transportation** – moving freight among different parties
– **Warehousing** – storing and handling raw materials, WIP and finished goods
– **Supply Chain Network Design** – gaining a strategic view of the overall supply chain and the tradeoffs made as part of the planning and execution process

Because each of the above projects requires a structured thought process to plan, each is presented as a component of a project where UTi Worldwide partnered with a client. The examples that follow provide an explanation of the business opportunity, the business information generated and used, the data UTi and the client used, the decisions made, and the results the client and UTi achieved.

TRANSPORTATION ANALYSIS — AIR FREIGHT COST SAVINGS

The lengthening of global supply chains and shortening of order cycle times has made air freight a vital mode in the global supply chain. Air freight is generally used to ship high-value, low-weight, small-sized cargo across long distances. But despite air freight's high cost, few shippers use data to optimize spend by identifying packing, consolidation, postponement, or chargeable opportunities.



Opportunity

An industrial products manufacturer sourced from more than 100 U.S.-based suppliers and shipped to a manufacturing site in Asia. Because of specific product attributes and business policy, the shipper's primary mode was air freight, and the freight could not be mixed with products from different suppliers. The company struggled with high freight costs and did not have in-house resources to perform a physical packaging or value-stream analysis. Instead, the company sought to work with UTi to analyze its shipment data to identify actionable opportunities for greater spend efficiency.

EFFECTIVE SUPPLY CHAINS WILL USE BIG DATA AS A SERIES OF INCREMENTAL OPPORTUNITIES AND NOT A SINGLE PROJECT WITHIN A FUNCTIONAL DOMAIN.

Business Information Derived from Data

UTi's analytical team worked with the company to discover that total chargeable weight was 80 percent greater than actual weight. By performing a root-cause analysis, UTi was able to isolate three main causes of weight variance between chargeable weight and actual weight:

CAUSE #1: OVERSIZED SKID



Skid used by packer is larger than needed

CAUSE #2: PYRAMID LOADING



Configuration of pallet is suboptimal for minimum needed volume

CAUSE #3: OVERSIZED PACKAGING



Though properly palletized, excess dimension weight caused by individual carton size

Key Data Utilized

Product dimension (carton level), number of cartons per pallet, skid dimension, palletized cargo dimension, actual weight, chargeable weight, freight costs, carton strength, actual service level and required service level were examples of the data types used to form fact-based recommendations.

Information-Based Decisions

The company decided to launch a pallet-optimization process with its suppliers based on the largest cost-saving opportunities identified. The first step was to create optimized pallet configurations at the freight forwarder's facility prior to loading on the aircraft.

Such a process change meant that the freight forwarder needed to evaluate the pallet configurations in use and determine the value of re-palletization based on dimensional and weight data. Ultimately, the company identified key indicators that helped it decide whether or not to swap in a more reasonably sized skid or simply re-palletize the cargo on the original skid.

Results

After completing the analysis, the shipper achieved $240,000 in annual savings by optimizing pallet configuration from a single supplier. The information also helped the client identify suppliers that should optimize packaging based on carton dimensions and weight. The program was rolled out across multiple suppliers and forwarders.

WAREHOUSING ANALYSIS — CASE-PICKING REDUCTION

Physical warehousing plays an important role in most companies' ability to balance supply and demand. Many companies have invested in significant warehouse improvement projects, primarily in labor and equipment utilization, physical movement flows, information flows and waste analysis. However, there exist data driven opportunities as well that some companies may overlook.

Opportunity

A cleaning and sanitation products manufacturer's warehouse processed more than 500,000 order lines and shipped to more than 5,000 locations in the U.S. annually. The company conducted a number of lean improvement projects within the warehouse, but believed additional opportunities for improvement remained outside of the picking process. To isolate such opportunities, the company decided to look more closely at the large sets of data being captured by the myriad tools and technologies inside and outside the four walls of the warehouse.

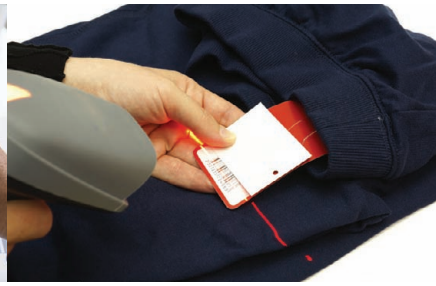
Business Information Derived from Data

The company believed that case picking led to additional supply costs, damages and customer service costs (such as order processing). Ultimately, the company wanted to make a decision on whether to change customer order patterns, given the cost savings that might be associated with such a change. Most importantly, the company wanted to understand opportunities related to changing how customers order. To do this, the company needed to know how many picks were completed by case vs. pallet. They discovered that 37 percent of order lines were case-picked. In addition, they needed to understand the labor impact of picking by pallet or case. The information generated showed that case picking was more labor-intensive than full pallet picking (labor cost of $0.20 per case if picked by case vs. $0.03 per case when picked by pallet).

Key Data Utilized

Customer details, order history, standard packaging data, costs (transportation, warehousing, products), action/motion (receiving, picking, order processing, etc.), damage reports were examples of the types of data required to form our recommendations.





Information-Based Decisions

Based on the information generated, the company developed a customer collaboration platform to 1) change the minimum order size, and 2) change from case picking to full pallet or layer picking. They also sought to optimize the existing package configuration and deploy layer picking equipment and processes.

Result

By reducing case picking, the client was able to achieve total annual savings of $216,000 at the warehouse level. Damages and service levels were also improved significantly.



SUPPLY CHAIN NETWORK DESIGN

Companies are faced with managing unpredictable cost drivers such as raw material costs, wage rates, exchange rates, duties and fuel surcharges. In addition, buyers are constantly reevaluating suppliers to obtain higher-quality, lower-priced materials and components. Because of this increasingly dynamic marketplace, demand locations and volume may change dramatically within very short periods. As a result, today's supply chain leaders must continuously reevaluate their supply chain network to remain efficient and competitive.

Opportunity

Due to increasing pressure from competitors, a personal care products manufacturer sought a strategy that would increase its ability to execute next-day deliveries. Its existing next-day delivery rate of 5 percent did not meet its customers' expectations. The company had three distribution centers (DCs) in North America and was unable to increase its DC footprint with additional locations due to financial constraints.

Business Information Derived from Data

To analyze its options to deliver in a more timely manner using existing or fewer assets, the company needed to understand the drivers of transportation cost. Specifically, it sought to understand not only the additional transportation costs incurred due to service-area overlaps, but also service gaps among its three DCs. First, the team analyzed historical supply and demand patterns, and applied a forecast. The team then conducted *what-if* analyses to identify the optimal supply chain network that minimized total supply chain costs while meeting or exceeding its required service levels.

Key Data Utilized

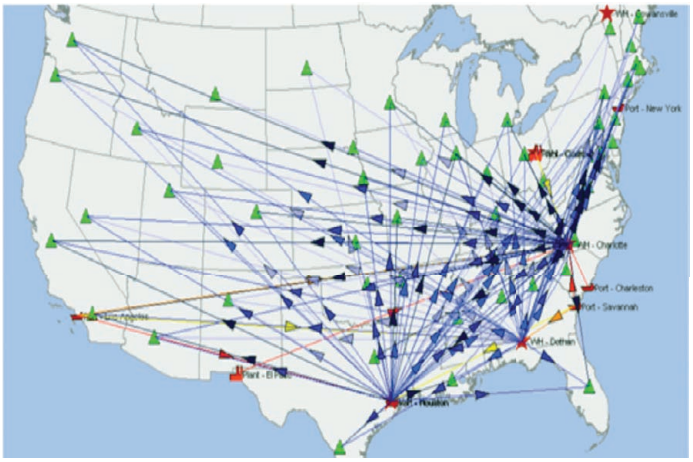
Shipment details (from origins to DC, from DC to final destination), actual service level, service level requirements, transportation costs, costs of each DC (facility, management, inventory, labor), benchmarking costs and sales forecast data were used to define the optimal DC network.

Information-Based Decisions

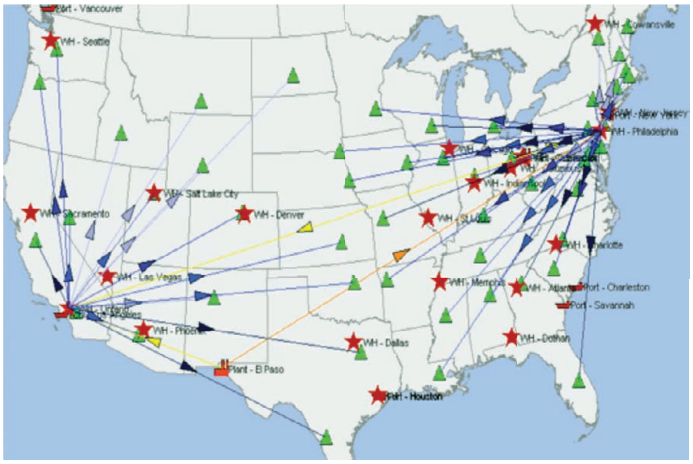
By building supply chain network models, the team quantified the trade-offs between service level and total supply chain cost. After testing multiple scenarios, the company determined its optimal distribution network and decided to implement the recommended supply chain.

The decisions the project enabled included:

- Changing from three DC locations to the optimal two new DC locations
- Adjusting ports of entry for international shipments based on the new DCs
- Defining the service areas to be covered by each DC



BEFORE: 3 DISTRIBUTION CENTERS



AFTER: 2 DISTRIBUTION CENTERS

Results

The company's total network cost was reduced by 13 percent ($4M per year). Despite having one less distribution center, the company's next-day deliveries improved from 5 percent to 35 percent of total demand.

CONCLUSION: WHAT COMPANIES SHOULD DO BEFORE INVESTING IN BIG DATA

As demonstrated in the three examples, data-driven projects can vastly improve how supply chains create valuable insights and improve decision-making related to opportunities. However, to create a repeatable process to extract value, companies must first evaluate the business information needed to make a decision. This structure simplifies the process of sifting through the tremendous amount of data and focuses the project on a decision. After completing the four steps outlined, companies will be better positioned to make go or no-go decisions.

The supply chain's ability to continuously evolve will continue to drive many firms' future competitiveness, and leveraging big data will be a key means by which competitive supply chains allocate resources. Companies must focus on converting data into timely information and knowledge so that decision-makers can take action quickly. Otherwise, resource-intensive supply chain big data projects are likely to fail, take far too long or under perform in very measurable ways.

Yan Cui is a senior consultant with Supply Chain Design & Innovation at UTi Worldwide, a global supply chain management company. He may be contacted at ycui@go2uti.com.



UTi Worldwide
c/o UTi, Services, Inc.
100 Oceangate
Suite 1500
Long Beach, CA 90802
USA
+1 (562) 552 9400
www.go2uti.com

RDOM3677-BigData-WhitePaper-r2f October 8, 2014 6:40 PM