# Supply Chain Management Best Practices

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## Study Background

Because supply chain performance directly affects quality, customer lead times, inventory levels, and delivery time, supply chain management has a direct impact on company bottom line. Understanding the very latest systems, practices and world-class performance in supply chain management is a key component in evaluating one's own organization. This Best Practices Benchmarking™ Report is crucial for helping supply chain managers to identify and correct critical performance gaps. The report also provides specific direction for improving processes and maximizing shareholder value.

The study was originally conducted for a high-tech manufacturer, looking across the entire supply chain at metrics and best practices in delivery performance, cycle times, supply base management, costs and productivity initiatives. Information was gathered via interviews with executives in leading supply chain organizations, surveys of dozens of leading companies, and online research on more than 100 companies. Months of diligent and thoughtful research are synthesized into 135 indispensable pages — serving as a playbook for future supply chain initiatives.

### Benchmarking Report at-a-Glance

**Featured Companies**

More than 100 companies including:

- DaimlerChrysler
- Dana Corporation
- Dell Computer
- Eastman Kodak
- FedEx
- Ford Motor Company
- Hewlett-Packard
- HON Industries
- Intel
- Johnson Diversey
- Lexmark
- Motorola
- Siemens
- Wal-Mart

**Industry Analysis**

- Supply chain managers seek to improve and enhance operations to boost competitiveness in the face of increased marketplace and profitability pressure.

**Information Types**

- 24 Data Graphics
- 88 Quantifiable Metrics
- 22 Manager Narratives
- 45 Best Practices

**Report Length**

- 135 pages

# EXECUTIVE SUMMARY

**Supply Chain Management Best Practices (OP-87)** profiles a class of companies that demonstrate successful practices in managing supply chains. By studying these companies, your organization can gain a deeper understanding of how leading organizations manage systems and programs to which leading executives attribute success.

To assist companies in assessing their supply chain functions against that of industry leaders, Best Practices LLC benchmarked a select class of manufacturers. Benchmark findings provide executives with the tools necessary to perform a gap analysis, identify potential areas for improvement and close performance gaps to eclipse the competition.

Specifically, this study examines the following components of industry-leading supply chain management:

- Performance to standard measures such as on-time delivery, fill rate, lead times, etc.
- Supply chain costs and cost saving initiatives
- Demand/supply chain initiatives that enhance the working relationship between vendors and customers, including BTO (build-to-order – mass customization), CPFR (collaborative planning forecasting and replenishment), VMI (vendor managed inventory), ATP (available to promise), cross-docking, and outsourcing to third party logistics providers.

With respect to the benchmark class, Best Practices LLC cast a wide net, communicating with dozens of companies highly regarded for their supply chain practices. All invitees were considered "best-in-class" for supply chain issues, either because of favorable press, opinion polls and other rankings, and/or financial analysis based on publicly available data. An invitation to complete an online survey was issued to executives at each company, designed to capture quantitative supply chain metrics and to clarify as to whether these companies met benchmark criteria of some element of Asia/Far East sourcing, short product life cycles, and technology/feature driven products.

Of these highly regarded companies, 27 completed the survey. The analysis captured the programs, systems, and measures of each company across the whole process. To shed further light on the survey responses, five key respondents were interviewed by our researchers. Building on the quantitative data captured in the survey, the interviews focused on supply chain system and tactical practice issues.

This report summary includes key findings, a description of the report structure, sample best practices, sample data analysis, a table of contents illustrating the study's focus, and an order form to facilitate purchase.

# METRICS INCLUDED IN THE STUDY

Performance metrics enable executives to perform gap analyses and identify areas needing improvement. Metrics are an important complement to the qualitative best practices included in this study report. Best Practices LLC analysts collected and analyzed the following key metrics for supply chain at each of the 27 companies benchmarked in the

study:

- **Delivery Performance Metrics** including on-time delivery, fill rate, and return rate
- **Cycle Time Metrics** including promised lead time, actual lead time, and supply chain cycle time
- **Inventory and Cash Management Metrics** including inventory days of supply, days sales outstanding, days payables outstanding, and cash-to-cash conversion
- **Supply Chain Cost Metrics** including overall supply chain costs, order management costs, inventory carrying costs, supply chain finance and planning costs, supply chain IT costs, procurement department staffing and savings

# KEY FINDINGS

### *1. Several companies have perceived 100% performance at a number of key measures, including on-time delivery, and fill rate.*

Performance to these measures, however, sometimes comes at a penalty, since some measures can be contradictory, if not mutually exclusive. For example, a high fill rate can be achieved by having a poor (i.e., high) inventory days on-hand measure. Several companies in the study, however, have optimized their systems to achieve excellent performance across the board.

### *2. Recent supply chain management trends include increasingly powerful private trading networks, increased transparency in measuring and monitoring the value chain performance, and outsourcing of non-core activities.*

The report examines the use of reverse auctions for procuring commodities as well as trends in increased transparency of the chain. The use of Third Party Logistics and Fourth Party Logistics companies is also investigated.

### *3. Cost management techniques, along with performance improvement initiatives, have revolutionized the entire supply chain management process.*

The study details more than 45 winning practices identified through partner interviews and background research on the latest keys to supply chain success.

# REPORT STRUCTURE AND ORGANIZATION

This report is organized into an executive summary, survey analysis and best practices in optimizing the supply

chain organization.

**Executive Summary –** This executive summary contains a discussion of background factors that led to the study. Best Practices LLC's research methodology, a summary of key project findings and a set of next steps for reader to consider are also included.

**Survey Analysis and Best Practice Chapter –** This section contains graphs of responses from the benchmark partners who completed our survey form. Analyses of the charts are included, along with any interview comments or learnings that are directly relevant to the area being probed. Best practices derived from research conducted by the Best Practices LLC team also are included. The section includes the following five parts:

- Introduction – sets the stage for the survey and practices
- Delivery Performance – covers on-time performance (to request and actual) and fill rate
- Cycle Time – covers lead times (promised and actual), supply chain cycle time, and return rate
- Inventory and Cash Management – covers inventory days of supply, days sales outstanding, and days payables outstanding
- Supply Chain Cost Management – covers order management and material acquisition systems; stocking and material handling programs; rent and utility efforts; inventory carrying, counting, shrinkage, and obsolescence management; and supply chain cost management relating to these efforts, along with related finance, planning, and information technology initiatives.
- Productivity Initiatives – covers Collaborative Planning, Forecasting, and Replenishment, Available-to-Promise, Supplier Managed Inventory, and Build-to-Order programs.
- Supply Base Management – highlights the specific programs mentioned by respondents that affect their supply chain management performance (details of these programs are available in a separate report published by Best Practices LLC covering supply base management).
- Best-in-Class Analysis – While there is a diverse group of partners in this study, a mechanism for the reader to conduct a best-in-class analysis is offered.

**Survey Response Matrix** – Specific survey responses from each company are shared in this matrix.

**Lessons Learned –** This section includes interviewee insights on:

- Keys to Success and Ongoing Initiatives – Identifies the keys to success interviewed executives shared, along with a listing of ongoing initiatives designed to optimize partners' supply chain.
- Lessons Learned and Top Challenges – Identifies benchmark partners' top lessons learned and challenges in managing the supply chain function.

- Interview Notes – A summary profile of the complete supply chain system at select partner companies.

# SAMPLE PRACTICES

**Use build-to-order/mass customization principles to reduce excess inventory and speed product delivery.**

Widely known for its super-efficient supply chain, **Dell Computer Corporation** successfully uses a build-to-order manufacturing program to hold down its inventory to only a five-day supply while shipping 95 percent of customer orders within eight hours. In an industry where materials costs are dropping and where technologies are rapidly becoming obsolete, this strategy gives Dell a key competitive advantage as a low-cost producer. Dell can reap the benefits of lower material costs almost immediately and reflect that benefit in its consumer product prices. In addition, it can minimize any excess or obsolete inventory by responding immediately to softening demand.

With a goal of replacing inventory with information, Dell uses i2 Technologies software to track its supply chain activities. Monitoring the system constantly, Dell is able to make immediate changes (within hours) to respond to fluctuations in consumer demand. The software also alerts Dell to any supply shortages. Dell rapidly communicates order information—including automatic replenishment requests — to its suppliers through the Internet. The company also uses the Web to keep suppliers up to date with its volume expectations and long-term planning data.

With a master production schedule updated every two hours, Dell's mass customization program enables 100,000 different computer configurations, 455 annual work-in-process turns, 52 annual inventory turns and a zero finished-goods inventory.

A dot.com company is also making use of this idea. In fact, **Reflect.com**, an online beauty supply firm based in San Francisco, is the only company in its industry with a mass-customized end-to-end supply chain. The company offers a website where consumers can design their own beauty products from a predefined range of options, even choosing the packaging and providing a product name. Using an OPTUM Software system, Reflect.com keeps a tight rein on inventory, tracking inventory and orders all the way from manufacturing through shipping. Keeping only a minimum supply of product and raw materials on hand, the company maintains close relationships with selected suppliers who are able to replenish materials in small quantities on a rapid or 24-hour basis.

At **Hewlett-Packard** (which is a benchmark partner, but is blinded in the survey portion of this report), the model is slightly different, relying on the concept of postponement to minimize forecasting mistakes and to manage inventory and production. Postponement entails building a generic product and then customizing it at the end of the manufacturing process. Through this mass customization program, HP need not design and build unique products for different customers in a variety of countries and markets. Instead, last-minute customization can be done in accordance with actual demand.

Because many high-technology companies produce different kinds of products for a myriad of customers, countries, and markets, it is difficult for them to forecast demand and plan inventory and production. Customizing products for a particular market too early in the manufacturing process can be disastrous. Postponement is the process of

designing a generic product and then customizing it at the end of the manufacturing cycle. Much like design-for-manufacturability or design-for-recycling, product designers have a significant bearing on the success of postponement.

This concept is being played out in HP's laptop build-to-order program, which allows customers to order custom HP laptop computers direct from the factory. HP's program reduces the channel inventory of HP's OmniBook and Pavilion laptops by providing only a few actual systems to retail outlets as demos. Customers will use the demos to get a hands-on idea of the laptops, then order custom versions for themselves using online kiosks set up by the retail outlets and linked to HP's retail website via the Internet.

Build-to-custom-order (BTCO) laptops are also be available through HP's own online retail website. With the BTCO program, HP's laptops can be customized with practically any available system feature, including wireless networking, a variety of CD-ROM and DVD options, a range of processor speeds and memory, and a choice of operating system. All BTCO orders are built and shipped directly from contract manufacturer's factory in Taiwan, with domestic rush orders available through express carriers. This plays to FedEx's strengths, since the FedEx network was designed to deliver small packages, including single-lot shipments, in a very inexpensive manner. HP has committed to shipping the built-to-order notebook PCs within a week of the order being placed, with shipment from Taiwan to the client site completed with two to three days – for a total of 10 days lead time. An effort by FedEx to streamline the customs process also aids in bringing about rapid delivery.

Besides encouraging consumer customers to explore and purchase the range of laptop computer options and configurations offered by HP, the BTCO program also greatly reduces the number of actual laptop units needed to be shipped to retail stores. BTCO will also allow HP to upgrade its portfolio of consumer laptop features more rapidly, with less concern for outdated configurations that could be still sitting on retail store shelves. The BTCO program benefits retail outlets as well by way of smaller inventory investments. Finally, HP experienced a 20 percent increase in order quality, since fewer touches occur in the supply chain process.

In an example of how HP executes its postponement strategy, the company's Gueltstein, Germany manufacturing facility sources the bare bones, lowest common denominator (LCD) box from outside Europe. These LCD boxes are bought against a forecast plan. The stock onhand typically represents three weeks of supply, but this time can be stretched for unusual circumstances (aviation strikes, etc.). Through a global replenishment system, HP laptop critical components are stockpiled in a worldwide central location. To pool the risk, HP aggregates demand uncertainty across multiple operations, ultimately reducing the minimum inventory required for a two to three day replenishment process.

Memory is a good example of such a critical component. This commodity is centrally procured and stockpiled in Puerto Rico. The HP owned facility acts as a virtual buyer for the products being produced abroad. Procurement teams have access to the material resource planning systems at the German and other facilities, eliminating multiple procurement processes and spreading the risk across several country units. HP's suppliers receive an aggregated demand report, separated by region. Individual transactions are then executed and managed on a regional level. HP owns all material flows between suppliers, manufacturing facilities, and customers. Tracking and tracing material in-house eliminates uncertainty around inbound and outbound material flows.

## Develop a pull system to increase inventory turnover, reduce production costs, and restock quickly.

**Hewlett-Packard's** desktop computer division implemented the pull system and was able to increase its inventory turnover from 7.5 to 45.6 in a space of only nine months. An early improvement was reorganizing assembly from clustered-jumbled to clustered flow-line. This shortened flow eliminated work orders and conversion to visual shop floor control.

The visual system begins with an "exploded" customer order; that is, the computer explodes the major modules into components. The final assembly and test people need a copy of the exploded listing. The assembler picks tested modules (e.g., a keyboard) from a kanban rack. The empty space in the rack is the pull signal (or *kanban*) that directs the module test department to test another of the same type. The test equipment operator pulls an untested keyboard from a rack which leaves an empty space, signaling the module assembler to build another. The pull signals wind backward all the way to raw stock. Purchasing orders more raw stock based on what the customer orders are calling for.

The turnover rate of 45.6 means that a few days' worth of the average module, subassembly, or part is on hand. Only a few of each part number are there, but that is enough to complete and ship most orders. The purpose of the pull system is to replenish, making it likely that the next customer order will be completed quickly. It is vital not to lose track of any item or have to spend any time searching for the right part. It is also vital that no assembler or machine operator gets bogged down working on a part number that will not be needed for a long time.

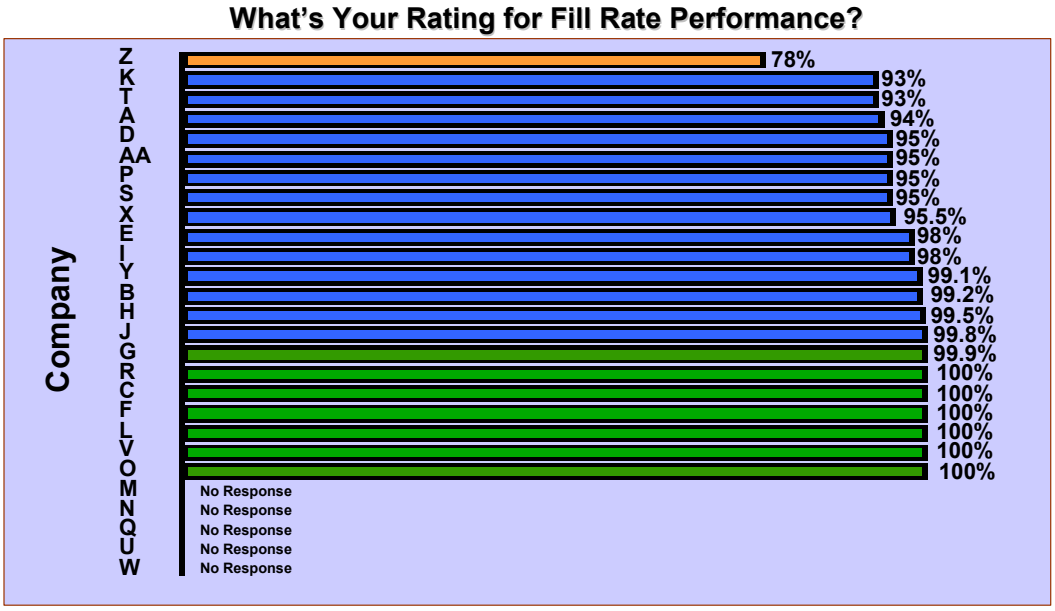
HP employs the following pull concepts to make sure that everything is under control on the shop floor:

| Pull Concept | HP Procedure |
|---|---|
| Minimum container sizes and transit quantities between clusters | Usually hand-carry just one or pushed a wheeled cart of components for just one |
| Minimum lot sizes | Usually just one |
| Minimum setup times, so that a small lot size is economical | Most setup times are negligible; IC insertion machines are stocked with tubes or taped strings of components, and a new floppy disc executes a change |
| Small allowable number in rework | Stop primary production and do the rework when a small number of rework kanban are used up |
| Minimum number of stock points | Completed unit goes into nearby kanban rack or onto kanban square immediately |

# SAMPLE DATA ANALYSIS

## Fill Rate

***19% of respondents reported near perfect fill rates. 54% achieve fill rates in the 90% range . 23% did not respond or achieved lower rates***




**Fill rate performance:** Calculated as quantity shipped / quantity ordered (average for most recent quarter or year).



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Eleven respondents noted fill rate performance in excess of 99 percent, and six reported rates of 100 percent. To understand performance in this dimension, Best Practices researchers interviewed several executives from these higHPerforming, comparable companies. Specifically, they were asked, "What factors positively influence your fill rate performance?"

**Company M's** performance on this dimension approaches 100%. Closely linked to its achievement in the on-time measure, Company M's exemplary performance is driven via its rapid and flexible manufacturing process. In one product line, its build-to-order system has incoming orders produced and ready for shipment in less than one hour. For those products that are re-branded, and also those produced for other companies (taking advantage of any excess capacity), Company M employees can easily switch between internal orders (produced in support of other company product lines) and external ones. The process is also flexible such that orders from single units to an end-user in Asia are handled very much the same as for large volume orders for a strategic customer in the same U.S. state. The simplicity of having one process, with reduced options and variability, helps to ensure quality production and

exemplary delivery performance.

Company M, and other top performers, produce every order at once – regardless of order size (which may range from single units to thousands of units – which helps to ensure a 100 percent fill rate. The company also credits a full and seamless material demand information flow to suppliers, ensures no shortages occur when orders exceed the current on-hand inventory of raw materials. Communication mechanisms of this company (and others) are profiled in the Supply Base Management appendix of this report. Transparent communication mechanisms directly affect fill rate on large orders. Another practice detailing Company M's pull system and its effect on delivery performance follows this interview discussion.

Much like the practices that influence its on-time delivery performance, **Company I** reported its fill rate performance is driven by providing unsurpassed customer satisfaction and pursuit of operational excellence. **Company K** also reiterated that generating and holding to accurate forecasts, along with regular communication with the sales staff and suppliers, was key in their performance.

**Company AA**, which also has a superior fill rate performance, does so at the cost of a higher amount of inventory on hand. This inventory is strategically sited around the region at a number of stocking locations. While a large number of such sites helps to optimize service levels, too many can inflate inventory levels beyond what is necessary. Since responding to the customer with rapid deliveries and complete orders is an important aspect of their business, they've decided to sacrifice the balance sheet implications for the sales and market share ones.

Beyond the executives interviewed for this section of the study, Best Practices researchers also uncovered a number of other tactics in place at "best-in-class" companies.

# Table of Contents

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