Effective Benchmarking Strategies

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# Table of Contents

Author Bios ........................................................................................................ 2  
Executive Summary ............................................................................................ 4  
Effective Benchmarking Strategies ................................................................. 5  
Benchmarking by Industry ............................................................................... 8  
  Auto .................................................................................................................. 8  
  Retail ............................................................................................................... 9  
  Other Industries ............................................................................................ 10  
Implementing a Benchmarking Strategy ......................................................... 11  
Conclusions and Recommendations ............................................................... 14  
Possible Metrics ............................................................................................... 15  
  Global Supply Chain Performance .................................................................. 15  
  Supply Chain Execution Performance ............................................................ 15  
  Operational Performance .............................................................................. 15  
Benchmarking Resources Online .................................................................... 16  
  Benchmarking Tools ...................................................................................... 16  
  Reports on Benchmarking ............................................................................. 16  
  Organizations that can help ......................................................................... 16
Executive Summary

Having an effective supply chain offers a substantial competitive advantage. Those companies who do, generally have cash to cash cycle times of less than 30 days, operate with less than 40 days of inventory, and have "delivery performance to request" numbers approaching 100%. Furthermore, these companies enjoy savings of 5 to 6% on supply-chain management costs as a percent of sales. Not only do they perform better than their competitors, they do so at a lower cost. Despite the benefits, end-to-end supply chain effectiveness is rarely measured. The tendency, instead, is to measure what is easily quantified, rather than what is of strategic importance.

To be a best-in-class performer, it is necessary to understand the functioning of your supply chain in terms of its reliability, responsivity, flexibility, asset utilization, and cost. To do so requires a corporate commitment to measuring and benchmarking your supply chain from end-to-end.

In this white paper, we outline:

- **How to establish performance benchmarks.** There are metrics – both industry specific and common to all industries – that should be considered in establishing a strategic benchmarking initiative. However, it is critical to recognize that supply chains are not standardized operations. Consequently, it can be very difficult to find a peer or peer group against which to compare your organization. As a result, benchmarking their supply chain while instituting a program of continuous improvement is an approach that many best-in-class companies have embraced.

- **How to implement a benchmarking program.** There are several tools that can be employed; we’ve addressed two of the most relevant. The most popular is the Supply Chain Council’s Supply Chain Operations Reference (SCOR) model. This tool offers four layers of analysis, with differing degrees of specificity and the metrics are divided into customer-facing and internal-facing measures. Another, warehouse-specific tool, is Georgia Tech’s Internet-based Data Envelopment Analysis System (iDEAs), which provides a system performance index.

- **How to promote the continuous improvement of your supply chain.** Companies must remember that benchmarking and metric selection cross departmental boundaries and collaboration is essential to extract full value. To accurately assess global supply chain effectiveness, companies must also measure their suppliers’ performance. Furthermore, when selecting a supply chain system, companies must consider such factors as its capacity to measure performance and to report results clearly and concisely as critical attributes of system functionality.

- **Where to find other benchmarking and metric-selection resources.** Detailed information on SCOR, iDEAs, and other research that has been undertaken in this area may be found through the links in the Appendix. There is also a list of possible metrics for assessing global supply chain performance and supply chain execution performance.

Measurement of supply chain effectiveness has substantial and proven benefits to companies who adopt these practices. However, few companies do it comprehensively. Through the adoption of a formal supply chain measurement process, using YOUR COMPANY as the baseline, you will obtain the necessary information to improve supply chain efficiencies and achieve significant competitive advantage.
Effective Benchmarking Strategies

We all hear a lot about benchmarking, and how it can improve an operation. But based on industry practice, it’s clear that few companies are doing it in a global and strategic manner. Our research indicates that most benchmarking initiatives that have been implemented to date are typically limited to very specific performance measures, which are often tactical in nature. Furthermore, they may not address corporate goals for reliability, responsivity, flexibility, asset utilization, or cost. They also tend to look inward, at specific operational issues, rather than outward, at the customer. Employing a global benchmarking strategy – one that covers your supply chain from end-to-end – may seem like a costly undertaking, but those companies whose supply chains are highly effective and efficient reap huge rewards. And by benchmarking your supply chain and instituting a program of continuous improvement, you can enjoy those rewards too.

When a company undertakes a program to measure and improve their supply chain, the pay-off can be quite significant. In the area of supply chain execution (SCE), where concrete operational requirements are addressed, once a program of benchmarking and continuous improvement has been undertaken, companies will usually enjoy improvements in the range of:

- Inventory reductions of up to 50% over time
- Labor savings from 20 to 40%
- Administrative costs decrease by 15 to 25%
- Space utilization increases of 10 to 20%
- Physical inventory costs diminish by 75%

(Source: Modern Materials Handling 2001)

Metrics that encompass the entire planning and execution cycle tend to be somewhat less operational in nature and have more of a focus on end-to-end supply chain effectiveness. In a study that examined supply chain effectiveness metrics for 110 companies, among best-in-class performers there were substantial savings in a variety of areas, and substantially better customer service. The following attributes were found about best-in-class performers:

- They operated with less than 40 days of inventory throughout the supply chain
- Their asset utilization was 60% to 100% better than median performers
- Their cash to cash cycle times were less than 30 days
- Their “Delivery performance to request” numbers approached 100% (well above the median scores of 69% to 81%)
- They enjoyed savings of 5 to 6% on supply-chain management costs as a percent of sales.

(Source: Performance Management Group 2000)

AMR recently conducted a survey of logistics executives to rate the importance of the metrics typically used to measure supply chain efficiencies. As shown in the following figure, of topmost importance was increased inventory turns, followed by lowered inventory carrying costs, reduced cycle times, and improved fill rates. It is clear that companies are emphasizing metrics that they can measure easily, like inventory levels and cycle times, rather than factors that will more clearly contribute to their future success, like customer satisfaction and operational flexibility.
Those firms employing SCE systems have at their disposal a number of measures that can be used to evaluate the performance of their supply chain in general. Some of the most widely used metrics to evaluate supply chain performance include: the number of customer complaints, the rate of on-time delivery, order-fill rate, inventory accuracy, outbound freight costs. The Figure below, obtained from a study presented at the 2001 WERC Annual Conference, describes the most commonly employed metrics and their rate of use. It is interesting to note that almost one quarter of survey respondents did not measure the number of complaints as a means of assessing customer satisfaction. Once again, the emphasis was on easily quantifiable measures like freight costs and inventory accuracy, rather than more elusive and abstract goals, like customer satisfaction.

**Setting the Baseline**

*Most Often Used Measures*

- Customer complaints: 77%
- On-time delivery: 79%
- Order fill: 81%
- Inventory count accuracy: 86%
- Outbound freight costs: 87%

Source: AMR Research, 2002
While the above detailed performance measurements are interesting, and provide a feel for the types of measurements currently being undertaken, they primarily indicate what areas are most readily measured, and thus what areas are first targeted for improvement. The performance gains noted by Performance Management Group (PMG) and Modern Material Handling (MMH) require a more comprehensive approach, and first necessitate the implementation of an effective supply chain management system. The PMG and MMH numbers are also industry averages, and are not guarantees that your company can achieve similar supply chain efficiency gains. To achieve these kinds of results, it is essential that global supply chain metrics be established and thoroughly analyzed.

A significant challenge exists when trying to establish performance benchmarks for your own supply chain. A SCE system will enable managers to collect and quantify the performance measures for comparison quite readily; some believe that this may not be enough. External benchmarks can be very helpful indicators of how one operation’s numbers perform against similar operations and can be a highly effective means of identifying general areas for improvement or for identifying areas where things are functioning well. However, supply chains are not standardized operations, and it can be maddeningly difficult to find the appropriate peer or peer group because of all the variables that can affect the results.

The retail sector, for instance, employs the number of cartons per hour inbound and outbound as the most consistently measured indicators of velocity. One top retailer is able to process over 2 million cartons each year, processing, on average, 54 cartons per hour (fully loaded) and 78 cartons per hour (production). The “cartons per hour” measure is popular because the “carton” is the unit of measure most often used, and the metric most readily available. This is a level of supply chain velocity that few in the retail sector are able to achieve, and it requires a corporation-wide commitment to excellence and operational oversight.

In auto-parts distribution, the most popular performance measure is lines per hour. For instance, one large automaker’s aftermarket parts operation, in the face of a strong union and employing little automation, achieved 8.3 lines/hour/employee. This operation has also been successful in increasing its productivity by 10% each year. Another automaker (who does not include administrative personnel in its productivity calculations) achieved 36 lines/hour/employee for receiving, and 102 lines/hour/employee for outbound, and its numbers also continue to improve. This disparity highlights the fact that two operations, even in the same industry, have substantially different performance numbers. Both operations have a profound commitment to operational improvement and are each very successful at managing their respective supply chains -- and yet, using the same metric, their performance numbers are wildly divergent. As a result, comparing yourself to a “peer” may not be an indicator of how effective your operation is, and may not serve as a barometer of the potential for improvement.

Some factors that make it difficult to compare one operation against another include: the presence or absence of material handling or RF equipment, warehouse size, mechanization, product placement, physical warehouse layout, compliance levels. All of these characteristics (and many more) can affect overall performance, so it can be challenging -- and potentially misleading -- to compare the performance of one warehouse against another, even if in the same industry. Consequently, internal benchmarks should be established and used with a goal of continuous improvement. This means that the warehouse’s performance should be measured against a previously established benchmark -- of its own performance -- to evaluate operational effectiveness and improvement going forward. In other words, if you are planning a program of continuous improvement, use yourself as the baseline, and don’t rely on purported industry averages or gains.
Benchmarking by Industry

While certain metrics can be valid across multiple industries, many metrics are industry specific. These performance measures more accurately capture supply chain execution performance in the terms and quantities that are more relevant in evaluating how the supply chain is performing. It should be noted that despite the differences in the actual metric used, in ALL instances, the specific metrics are all functions of productivity, responsivity, accuracy, and cost and asset utilization -- regardless of the industry. Listed below are examples of the metrics used by leading companies in their vertical space and are typical examples of the type of information that needs to be captured as a component of a good benchmarking strategy. The metrics are by no means a complete and comprehensive list but are provided to illustrate the type of key metrics that some industry leaders are tracking and measuring.

Auto

Automakers are subject to certain stocking requirements that obligate them to carry minimum levels of inventory for a predetermined amount of time after manufacture. Consequently, inventory levels are higher, carrying costs are higher, and inventory turns are lower. The factors of most importance to the automaker service parts organization pertain to fill rates and productivity.

Typical industry metrics:

- **Lines shipped per hour per employee.**
  This metric is simply a barometer of total warehouse output and needs to be supported by individual departmental throughput in order to effect a continuous improvement plan and identify specific areas of improvement. Typical departmental metrics rolled up to support this would be small item pick rates, large item pick rates, etc.

- **Critical order lead-time – goal: overnight.**
  Best-in-class automakers are able to turn critical parts orders around overnight. This is essential to deal with problems associated with “vehicles off road” – namely, vehicles out of commission and requiring immediate attention. To address orders overnight requires that the service parts organization be able to perform the order taking activities, the inventory checks, produce a pick list with considerable efficiency.

- **Stock order lead-time – goal: under 18 hours.**
  If dealer stock requires replenishment, the efficient warehouse can differentiate between a critical order and a stock order, and prioritize between the two. Addressing stock orders within 24 hours is good, one automaker employing lean warehousing techniques offers lead times of only 18 hours.

- **Picking error rate – goal: 1 per 1000 lines.**
  The presence of a SCE system cannot completely eradicate picking errors, however, they can be mitigated substantially. A program can be put in place to improve picking accuracy by measuring the root causes and correcting them. Picking accuracies of 99.9% are exceptional, but not unheard of.

- **Fill rate.**
  This performance measure is primarily a function of having the correct inventory in the warehouse, and is typically indicative of purchasing effectiveness. However, ensuring that the correct item is in the appropriate location so that the order may be filled drives fill rates up. The levels of inventory to be carried are a corporate decision regarding cost.
containment, and this will substantially influence overall fill rates. 90 to 95% are considered excellent.

Operating Costs
These vary from facility to facility, and cannot be readily compared. What can be measured is internal improvement as a result of better information obtained from the SCE system.

Inventory accuracy - goal: 99.9%
When measured by location, inventory accuracy is one of the most telling indicators of the importance of a SCE system. Prior to implementing such a system, it is not uncommon to note accuracy levels in the 70 to 80% range (by location) primarily because work-in-process inventory is hard to reconcile without a real-time environment. Post-implementation, levels of 99.9% are not uncommon. This level of accuracy demands real-time cycle counting, accounting for work-in-process, a regimen of frequent cycle counts for fast-moving items, etc.

Number of times material is handled.
By reducing the number of people who handle the material, labor costs are lessened. To do so requires an understanding of process efficiency and a commitment to optimize workflow. Internal benchmarks are appropriate for this metric.

Retail
The retail sector, with its sensitivity to consumer demand, is characterized by a need for speed to market and the ready availability of the desired products. As a result high inventory turns are typical and significant pressures exist to collapse the time from supplier to store shelves. The presence of multiple fulfillment channels also complicate the process and requires substantial sophistication in the fulfillment practices to support store replenishment and “direct to consumer” fulfillment channels. Furthermore, consumer tastes change rapidly, resulting in high return rates. The following are some of the performance metrics pertinent to the retail sector:

Cartons per hour.
Products must travel through the distribution channels as rapidly as possible. There are no specific carton/hour benchmarks - these are internal numbers to be measured and improved upon as these numbers can vary depending on factors such as the level of automation, or the style of the facility (pull vs. direct to consumer). This is also measured in terms of throughput - with top retailers having a throughput of less than one day. Some retailers measure cartons per hour in receiving, value added services, shipping, and transfers. This metric is simply one of total throughput and must be supported by departmental results in order to effect continuous improvement.

Order backlog.
If products are languishing in distribution channels, they are not available for consumers. As a result, minimizing backlog is essential. Top retailers have backlogs of less than 2 days.

Pick rates.
To satisfy customer requirements rapidly, high pick rates are essential. Not surprisingly, relative to other industries, retail enjoys the highest pick rates. These rates vary by the type of facility, and are substantially influenced by the way work is allocated. As a result, this is a benchmark that must be established internally, so that different picking methods may be evaluated and the optimal method selected.
Return rates
Depending on the type of operation, retail can have return rates as high as 30%. By monitoring the reason for the return, it is possible to identify if the return was due to a pick-error and thus diagnose any picking problems. Using this information, operational improvements are possible.

Inventory accuracy - goal: 99.9%

Number of times material is handled.

Other Industries
The consumer products industry has specific distribution requirements. Because there are usually many products with markets that may vary due to seasonality or expiry, there is a premium placed on metrics that reflect the ability to fill orders promptly, and the need to carry only an appropriate amount of inventory so as to minimize carrying costs. Cycle times are also an issue so that changing consumer demand may be addressed more rapidly than the competition.

In high technology, the distribution characteristics relate to the high value of the products, and this high value is reflected in the metrics employed. For instance, the high value requires that there are tracking requirements such as serial numbers for warranties - compliance and quality measures are essential. Accuracy is also vital, as any losses would be substantial. Speed to market is an important supply chain measure, likewise a measure of the efficiency of value added services as high tech manufacturers often provide some customization.

What is important to note is that each industry, while employing different metrics, all measure productivity, accuracy, velocity, cost, and asset utilization. These are the most important attributes of supply chain effectiveness.
Implementing a Benchmarking Strategy

Choosing benchmarks needs to be done at a corporate level, and not in departmental isolation. The metrics may conflict with one another, and their selection may undermine global supply chain performance (though departmental performance may actually improve). For instance, if inventory velocity is measured in isolation, it may mask the fact that an inventory cushion has been pushed back on distributors. Lower inventory costs within the warehouse may be more than offset by higher costs from the distributor. Likewise, if fill-rate is the key metric and the warehouse performance is measured by its capability to fill orders promptly, this may prompt the warehouse to keep higher inventory levels. The increased inventory costs could be mitigated by prioritizing which orders to satisfy immediately, and which to delay, or by accepting that some number of orders cannot be filled immediately. A cost-benefit analysis in such instances is advisable.

The role of corporate goals must be further acknowledged when first choosing metrics and their related benchmarks. It is essential to establish which corporate goals take precedence. Are the goals fiscally motivated? Customer-service motivated? Productivity motivated? Accuracy motivated? These concerns should then guide metric selection. An additional challenge in the process of selecting which benchmarks to meet or beat, is that often specific goals may conflict with one another. Alternatively, departmental goals may be in conflict with corporate goals. It is essential to be alert to the “law of unintended consequences” when specifying which performance numbers will be used to measure a particular operation. Supply chain synchronization and optimization are the ultimate goals, and the specific targets chosen by a department should reflect that.

How your operation performs is not the only important thing to measure. It is also beneficial to measure how your suppliers perform. Do they deliver on time? Do they deliver the correct items? Vendor quality can be a vital component in the quality of the entire supply chain, and can substantially impact the performance of your operation. By knowing which vendors perform most consistently and satisfactorily, this information may be used to influence purchasing decisions or to determine quality management practices.

A potentially useful resource for additional metrics is the Supply Chain Council’s Supply Chain Operations Reference (SCOR) model. This tool offers four layers of analysis, with differing degrees of specificity. Metrics relevant to supply chain performance include measures of reliability, responsiveness, flexibility, cost and asset utilization. The SCOR model is considered the standard for supply chain measurement, and has been implemented by leading corporations such as IBM, Intel, Hitachi, Dow-Coming and Nabisco. The Figure that follows shows the Level 1 SCOR performance metrics, and demonstrates how they are divided into customer-facing and internal-facing measures.
To best implement a SCOR program (or any similar benchmarking program) there are several key steps:

1) **Find the right person to lead the project.** This must also be coupled with an executive sponsor. Without organizational buy-in, and the selection of someone who is eager to invest the time to learn and apply the benchmarking model, the program is unlikely to succeed. It may be advantageous to hire consultants with a domain knowledge and background in evaluating supply chain metrics to transition through any learning curve.

2) **Establish global supply chain goals.** The business team must establish a set of global principles and targets to guide the investigation and selection of specific benchmarks.

3) **Identify the opportunity and develop the scorecard.** The business team must sort through performance opportunities, including the use and functionality of the organization’s current technology and systems. It is important not to discard existing supply chain measures, but instead, existing metrics should be augmented by those metrics selected by the business team. Phasing in the introduction of new benchmarks, and demonstrating the relationship of the new measures with the old, may more readily achieve organizational support.

4) **Measure and analyze.** At this stage, the actual performance of the supply chain is evaluated. For example, the team may discover a major under-utilization of technology or that corporate goals regarding customer service are not being met. Alternatively, the team may discover that your operation is running well, but that there remains room for improvement. If the SCOR methodology is used, the Level 1 metrics serve to prioritize the “customer facing” metrics against the “internal facing” metrics, and actual performance is measured against benchmark performance. A gap analysis should also be undertaken to identify the value of potential improvements. The Level 1 metrics, which describe general processes and the scope of the model, serve as an excellent starting point and can be followed later by Level 2 and Level 3 metrics, which drill down to specific tasks and for which the data collection might be more cumbersome.

### SCOR Level 1 Performance Metrics

<table>
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<tr>
<th>PERFORMANCE ATTRIBUTE</th>
<th>CUSTOMER-FACING</th>
<th>INTERNAL-FACING</th>
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</thead>
<tbody>
<tr>
<td>Delivery performance</td>
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<td></td>
</tr>
<tr>
<td>Fill rate</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Perfect order fulfillment</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Order fulfillment lead time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply chain response time</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Production flexibility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply chain management cost</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Cost of goods sold</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Value-added productivity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warranty cost or returns processing cost</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash-to-cash cycle time</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Inventory days of supply</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Asset turns</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>
5) **Design and implement.** Based on the information obtained, the next step is to determine what operational improvements are necessary, and then the business team must guide their implementation. The SCOR analysis (or any other benchmarking analysis) is pointless unless there is a plan to actually use the information.

Undertaking such an extensive and intensive program of measuring your supply chain might seem daunting and costly. However, that is not the case. PMG employed the SCOR metrics in a survey of supply chain effectiveness, and it found that those companies that were diligent in measuring and monitoring their supply chain effectiveness enjoyed savings of 5 to 6% on their supply chain management costs as a percent of sales relative to their less diligent peers. Yet, despite the savings, PMG also found over 70% of companies do not track overall supply chain costs. Not only does it pay to benchmark, it is an obvious competitive advantage.

Beyond SCOR, whose scope is the entire supply chain at multiple management levels, tools exist to help users capture more tactical data such as warehouse performance. Internet-based Data Envelopment Analysis System (iDEAs), developed by Georgia Tech, is one such tool. It is a model that was developed in conjunction with the MHIA and LESA and is warehouse performance specific. iDEAs analyzes data regarding warehouse equipment used, headcount, floor space, square foot floor stacking, the number of broken case pick slots and the number of pallet rack slots, total orders shipped, broken case lines shipped, full case lines shipped, and pallet lines shipped. Based on this information, it provides a “system performance index” that indicates how a given warehouse compares with the other warehouses in the Georgia Tech database. If a firm has several warehouses, the index is also an effective way of comparing one warehouse against another.

In a presentation at the 24th annual WERC Conference by Dr. Karl Manrodt of Georgia Southern University, Dr. Manrodt found that the most commonly used performance measures of supply chain effectiveness were: customer complaints, on-time delivery, order fill rate, inventory count accuracy, and outbound freight costs. These measures were used by 77% to 87% of the respondents to his survey. The measures that were used the least were: inquiry response time, cash to cash cycle time, labor utilization as a function of capacity, units processed as a function of time, and cost to serve. He also found that 48% of firms did not measure invoice accuracy, 38% did not measure cycle time, 36% did not measure back orders, and 21% did not measure on-time delivery. However, he noted that those firms with a WMS were more likely to have a competitive advantage. It is apparent that the implementation of metrics does not follow a rigorous and well-considered plan at most organizations. Furthermore, the spotty utilization of performance metrics, and the fact that those organizations that measure their supply chain enjoy substantial savings, points to the competitive advantage that is derived from a well-implemented benchmarking program.

Using and selecting benchmarks are obviously key contributors to operational improvement. It is also critical to recognize the role of your supply chain system as the principal generator of this information. Not only must your supply chain system possess the capabilities necessary to manage your supply chain, it must also possess the capability to measure the various aspects of your supply chain. Without the latter capability, the likelihood of sustaining long-term improvement is very low. After all, if you can’t measure how well you’re doing, how do you know if you’re doing it better?
Conclusions and Recommendations

Following is a list of recommendations that should help you establish a benchmarking program so that you may obtain the related productivity and performance gains from your supply chain:

1) When determining the metrics to measure the performance of your supply chain, it is essential to remember that the metrics required may cross departmental and enterprise boundaries, extending to all members of your supply chain. It is also important that collaboration is essential in data gathering across all these entities to extract full value from your program.

2) When evaluating metrics, it is necessary to examine what, if any, unexpected costs or consequences arise out of any changes in policy, and to consider a goal of continuous improvement on a variety of fronts. Some goals may conflict with others, and a corporate goal of global operational improvement is a priority over departmental improvement.

3) Choosing an established methodology – like SCOR – will best ensure success.

4) When selecting a supply chain planning or execution system to assist in optimizing your operations, its capacity to measure performance, simulate process changes, collaborate, alert and advise of abnormalities in the supply chain, and report results clearly and concisely should be critical attributes of system functionality and are every bit as important as the base functionality itself.

5) In addition to measuring inter-company performance, namely how the internal links in your supply chain function, it is also essential to measure intra-company performance. Your vendors can have a substantial impact on the performance of your own supply chain, and by assessing their compliance and quality, it is possible to avert problems and inefficiencies.

6) In today’s complex supply chain environments, outsourcing of transportation, fulfillment, and value added services, etc., are common business practices. When selecting 3PL providers, it is important that in addition to the services they provide, that they also provide feedback through your metrics so that you may assess your global supply chain effectiveness.

Measurement of supply chain effectiveness has substantial and proven benefits to companies that adopt such practices. Yet based on recent studies, few companies do it comprehensively and some, not at all. We believe that the adoption of a formal supply chain measurement process, using YOUR COMPANY as the baseline, will not only provide the necessary information to improve supply chain efficiencies, but will also provide significant competitive advantage.
Possible Metrics

**Global Supply Chain Performance:**
- Delivery Performance to Request (measures delivery performance against the customer request date)
- Delivery Performance to Commit (measures delivery performance against the delivery date committed by the firm)
- Upside Production Flexibility (the number of calendar days to achieve an unplanned, sustainable 20 percent increase in production)
- Total Supply Chain Management Cost
- Cash to Cash Cycle Time (sum of days sales outstanding -- receivables -- and inventory days of supply, less days of payables outstanding)
- Order Fulfillment Lead Time
- Days of Inventory in Supply Chain
- Units Delivered/Units Scheduled
- Asset Utilization (a function of sales and total assets)
- Customer Service Calls
- Perfect Order Fulfillment

**Supply Chain Execution Performance:**
- Critical Order Lead Time
- Stock Order Lead Time
- Fill Rate
- Operating Costs
- Order Backlog
- % Orders/Units Filled Without Backorder
- Target Order Cycle Delivery Time
- % of Delivery Promises Kept
- Average Days Late
- Inventory Availability Levels, Stocking Levels, $ of Inventory
- Throughput
- Shipment Accuracy
- ASN Compliance
- Flow-through %
- Value-Added Productivity

**Operational Performance:**
- Lines Shipped per Hour (per Hour per Employee)
- Receiving Lines per Hour
- Pick Rate
- Picking Error Rate
- Volume of Errors
- Return Rate
- Inventory Accuracy
- Number of Times Material is Handled
- Cartons per Hour (Production, Fully Loaded)
- Cartons Processed (By Department)
- Cost per Carton, Cost per Order
- Labor Costs
- Operator Output Improvement
- Dock-to-Stock Time
- Warehouse Space
- Warehouse Productivity
- Space Utilization
- Shipping Discrepancies
- Receiving Capabilities
- Hours Paid
Benchmarking Resources Online

**Benchmarking Tools:**

**SCOR** - The Supply Chain Operations Reference (SCOR) model was developed by the Supply Chain Council, based on the real-world experiences of its members. The model defines common supply chain processes and matches them against best practices, offering a framework for a company to evaluate the performance and effectiveness of its supply chain. It also provides the capability to test and plan future process improvements.

http://www.supply-chain.org/slides/SCOR5.0OverviewBooklet.pdf

QPR has developed a software tool that uses the SCOR methodology and creates a scorecard with which to measure supply chain effectiveness.

http://www.qpronline.com/supplychainmanagement/

The following page has a series of links pertaining to SCOR and how to implement it successfully.

http://www.mfg-erp.com/scor.htm

**iDEAs** - Georgia Tech’s Internet-based Data Envelopment Analysis System is a model that was developed in conjunction with the MHIA and LESA. It is warehouse performance specific and provides an index with which to measure relative warehouse performance.

http://www.isye.gatech.edu/ideas/

**Reports on Benchmarking:**

Dr. Karl Manrodt’s research findings “Measuring Up in Logistics” presented at the 24th annual WERC conference in 2001. It describes the most and least commonly used performance benchmarks, and highlights the importance of a WMS in maintaining a competitive advantage.

http://www2.gasou.edu/coba/centers/lit/present/wercmeas.pdf

“Say Good-bye to the Weakest Link with Supply Chain Metrics” - This article at SupplyChainBrain.com from June 2001 highlights the need to view benchmark selection as a holistic process, as individual benchmarks may conflict with one another as localized performance improvements may lead to global inefficiencies.

http://www.supplychainbrain.com/archives/6.01.weakestlink.htm?adcode=75

“Advanced Performance Metrics for the e-Era” from IDSSystems describes the metrics and issues related to a “web-enabled” supply chain.


This report offers suggestions for different performance measures for matters such as customer service or internal processes.

http://zieglerd.com/free/Measures_and_Rewards.pdf

**Organizations that can help:**

The Performance Measurement Group provides benchmarking services that employ the SCOR model (which PMG helped to develop).

http://www.pmgbenchmarking.com

WERC has annual conferences where benchmarking and warehouse performance measurement are discussed.

http://www.WERC.org

This is the website of the Supply Chain Council where information on SCOR may be found.

http://www.supply-chain.org

Catalyst offers an optimization audit that will look at your existing metrics and identify areas where your operations can be improved.

http://www.catalystwms.com