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A Periodic Assessment of Industry Trends
PROVIDED BY AND FOR WAREHOUSING PROFESSIONALS



*Findings of a survey of
benchmarking measures conducted
among WERC members and
DC Velocity readers.*

DC Measures 2006

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This is the third year in a series of studies, which the Warehousing Education and Research Council (WERC) and *DC Velocity* magazine have conducted to provide members with improved guidance regarding the use of benchmarking measures across a DC. Again this year, the study was done in partnership with Georgia Southern University and Supply Chain Visions—both well-respected organizations in the area of performance measurement and performance management.

The study set out to help practitioners:

- Provide a benchmark of key measures by industry and type of business
- Gain a better understanding of how performance of key measures has changed over time
- Link key measures by industry type, supply chain structure and overall strategy

Over the three years of study, we have concentrated our attention on determining which of a broad range of DC metrics are deemed most important to our members and readers. We began the original study in 2003 with roughly 80 metrics, which were known to be commonly used. In the 2004 survey, we reduced the count to 55 and began to capture related performance data. This year the primary focus was to further reduce to a more manageable 35 metrics, which we see as the most critical measures used

today, with the balance of last year's measures placed into a sub-set of "additional" optional metrics.

In this year's study, we have continued our focus on actual performance data to allow for WERC members and *DC Velocity* readers to be able to compare the results to their own performance. As such, we can now provide a comparison between the year-to-year metrics, and with future studies, we will be able to trend performance improvements.

Participant Profile

This year's study received the support of over 900 WERC members and *DC Velocity* readers. Of these, 807 provided usable responses that are included in this analysis. Almost half of this year's survey respondents had a title of manager or supervisor. Participation by those at the senior vice president and CEO level of their company grew to 28% this year from 11.4% last year.

Note that this group may be a more positive sample as a whole, given their readership of a leading distribution magazine or their involvement with a premier warehousing and distribution association. These groups tend to attract high performers and those wishing to continually improve their operations.

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Figure 1. Respondents by Title

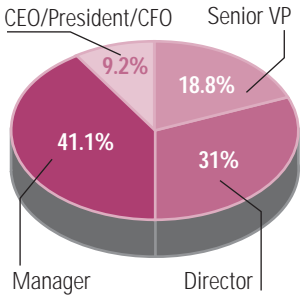


Figure 2. Respondents by Industry

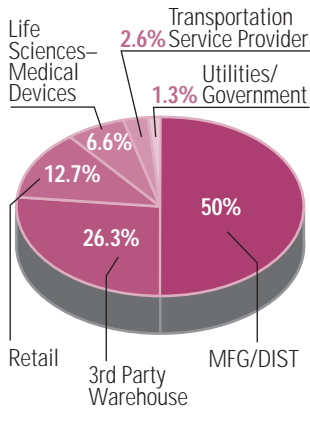
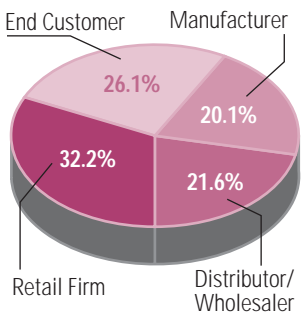


Figure 3. Respondents by Type of Customer



As we have stated in our previous reports, one of the most important rules in benchmarking is to benchmark with an appropriate partner. For instance, benchmarking a high school ski team against the Olympic snowboarding team may have some unintended consequences. Some of the same measures—such as time down the hill—are used in both. However, other measures may be similar on the surface only or may not be applicable at all causing confusion and misuse.

The research team reviewed 5 unique demographic areas, including:

- type of industry
- type of operation
- type of customer
- business strategy
- size of company

The team also did statistical analysis on the responses based on the survey response base.

Demographics by Industry Type

As would be expected from WERC members and readers of *DC Velocity*, a majority of respondents classified themselves in the manufacturing/distribution segment. However, this year's proportion is less than last (50% vs. 58%) and is offset by an increase in reports from 3rd party warehouse operators. Overall, the respondents from this year's study appear to be very similar with last year's respondents, even in light of the significant increase in participation.

Figure 2 provides a breakdown of the various business segments that participated in the study. The Manufacturing/Distribution segment totaled 50% of all respondents, with the second largest group being in the 3rd party warehousing segment, which had 26.3% of the total response base. A further breakdown and explanation of the manufacturing/distribution is found in Table 1.

Table 1.

Business Segment	Industry Breakdown
Manufacturing/Distribution	Consumer Products
	Aerospace/defense
	High technology
	Automotive
	General

Demographics by DC Operation

In addition to industry, respondents were asked how goods moved through their distribution center. As you can see from Table 2, the majority of facilities (68.7%) are picking cases rather than pallets.

Note that the majority of those picking cases are doing broken case picking, and the majority of pallet picking is by full pallet. These percentages roughly mirror results from prior years, although we have seen an increase over the past year in pallet shipments generally.

To calculate the percentages for the type of work performed, where many operations consist of both broken case and full case picking, we only used responses where at least 50% of the respondent's activity was in one of the four classifications. For instance, for a company to be placed in the "broken case picking" category, the respondent had to report that at least 50% of their operations were done this way. Those firms that tied in two classifications (50% each) or where no classification was greater than 50% were not used in the final benchmarking analysis.

Table 2. Respondents by DC Operation

Metric	2006	2005
Broken Case Picking	41.5%	35.9%
Full Case Picking	27.2%	30.2%
Full Pallet Picking	18.7%	20.5%
Partial Pallet Picking	12.6%	13.4%

Demographics by Type of Customer Served

Another important consideration is the position that the company holds in the supply chain. We were curious to learn if companies that are “upstream” suppliers used a similar set of measures to that of their customers or their customers’ customers. Respondents were asked to classify who their primary customers were in the supply chain. Figure 3 is a summary of responses. Just over 1/4 (26%) of those responding indicated that their customer was the end user of the products or services they provide. The largest group of respondents (32%) work for companies who sell directly to retailers. The remaining respondent’s primary customer is either a manufacturer (20.1%) or a distributor (21.6%).

Demographics by Business Strategy

How does a company’s strategy impact the measures that are used? Do different strategies place a higher emphasis on some measures and not on others? At what level in the organization should these differences be seen or noticed?

To answer these questions, we asked respondents to indicate the overall business strategy for their business unit or division. Specifically, we asked if the firm’s strategy was to be a cost leader, a customer service leader, an innovator, or to be all things to all people. This year’s responses were only slightly different from last, with customer service (37.6%) losing ground to cost leadership (14.7%) and mixed (37.2%) gaining. Product / market innovation (10.5%) continues to be the least-cited strategy.

Demographics by Company Size

The last major demographic studied was annual sales revenue, as a measure of the company’s size. It was hypothesized that larger firms may use more measures than smaller firms, or place greater emphasis on specific measures. While smaller companies had the largest segment, we

Figure 4. Respondents by Business Strategy

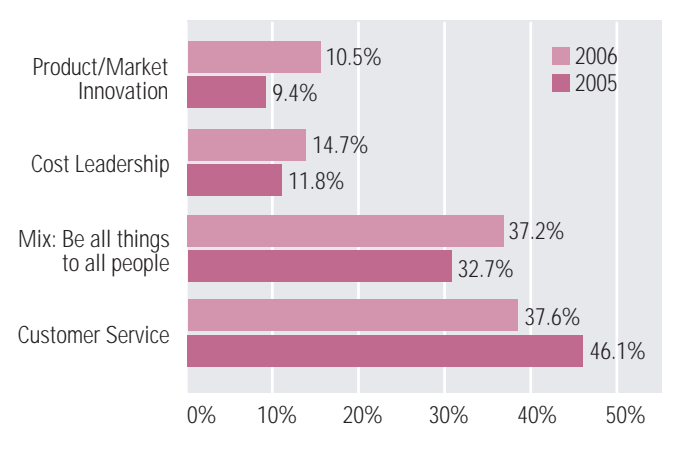
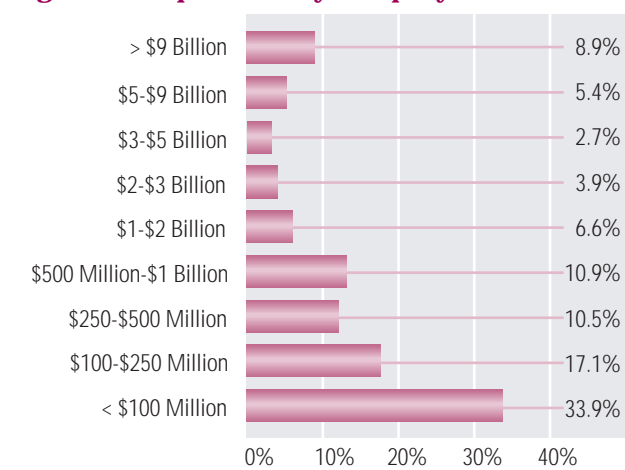


Figure 5. Respondents by Company Size



were pleased to find a solid range of company size that participated in the study.

Interpreting the Results

As mentioned above, a primary objective for study was to provide a benchmark of key measures by industry and type of business and to see how these benchmarks are changing (if at all) over time.

For the study, we collected two primary benchmarks: median performance and best practice performance. The median performance is the mid-point in the data. The reason we choose median versus **mean** (or average) is that the median, unlike a mean, is not easily swayed by outliers.

The data is provided based on both 2005 and 2006 best practices. This way, readers can see how firms performed against this year's best practice benchmark as well as last year's.

The second benchmark is the "best practice." This was accomplished by dividing each of the measures into five equal groups. This step determined "best performance" for 2006. The research team used this same method in 2005.

Because "best practice" performance is set against the total response sample size, the cutoff for best practice for one year's sample will not be the same as the cutoff for the previous year because the sample sizes and individual responses change each year. As such, the best practice benchmarks reported in 2005 do not directly match to the 2006 data.

For instance, the best practice for "On time receipts" in 2005 was defined as "greater than 98%." The best practice in 2006 was "Greater than 99%." In 2006 the median (the mid point of the respondents) for this metric was 95%. In 2005 the median was a full three points lower at 92%. For this reason, the data is provided based on both 2005 and 2006 best practices. This way, readers can see how firms performed against this year's best practice benchmark as well as last year's. In addition, readers are able to see how the benchmark has changed in just 12 months.

When reading the results, it is clear the numbers are different because of how the "best practice" benchmarks are calculated. But are these differences due to randomness or are they statistically significant? In other words, are these differences real? To determine this, 2005 results were compared to 2006 results to ascertain if the metrics were statistically different. **Measures that are statistically significant (at the 5% confidence interval) are noted with an asterisk.** In these cases, we are confident that the differences found are real and not due to normal variation.

A word of caution: this year we had a significant increase in the number of respondents. We greatly appreciate everyone's involvement and the increased attention with this study. However, because of the significant increase, care should be taken in comparing year-to-year changes. Some variation may be attributed to the different

sample size. In other words, some of the changes noted here may be due to who participated this year and did not participate last year. Over time it is expected that we will be able to more accurately report trends in the data.

What the Data Said

Tables 3 and 4 provide a summary of all of the metrics from this year's study presented with 5 columns that are aimed to shed light about how companies are performing.

- 1. METRIC:** Represents the metric that is being examined.
- 2. MEDIAN:** Indicates the median performance of *all* respondents.
- 3. BEST PRACTICE:** Shares the best practice performance as defined above.
- 4. and 5. PERCENT OF RESPONDENTS:** Represents the % of companies that have achieved best practice performance for 2005 and 2006. For example, column 5 represents the best practice for 2006, and provides the percent of companies that meet this benchmark in 2005 and 2006.

For instance, "on time receipts" was defined as "Greater than 99.0%." In 2005 only 15.4% of the respondents were at this level, while in 2006 23.4% achieved this benchmark.

There is one significant difference between Tables 3 and 4. As we noted before, the best practice was defined as the top 20% of all respondents. In Table 3, the best practice was set by the respondents in 2006. In Table 4, the best practice was set by the top 20% of the respondents in 2005. In both cases, the reader can compare how best practices have changed over the past year. Measures that are statistically significant (at the 5% confidence interval) are noted with an asterisk. This means that the level of performance reported in 2005 is different from what was reported in 2006.

Table 3. Best Practice Performance Based on 2006 Standard

Quality Metrics	Median	Best Practice Defined As	2005	2006
Fill rate – line*	97.3	Greater than 99.5%	11.2	20.6
Fill rate – order*	98.0	Greater than 99.5%	10.3	20.7
Percent of orders shipped complete*	98.0	Greater than 99.7%	12.2	20.4
Inventory shrinkage as a % of total inventory*	1.0	Less than 0.2%	42.6	8.0
Perfect Order Index	97.0	Greater than 99.4%	19.6	20.2
Backorders (back orders as a % of total orders)	5.0	Less than 1.5%	12.9	19.3
Annual work force turnover	10.0	Less than 4.1%	22.8	20.0
% of orders sent damage free*	99.0	Greater than 99.8%	45.3	26.6
% of orders with correct invoice	99.0	Greater than 99.9%	30.7	25.1
Inventory count accuracy	99.0	Greater than 99.8%	29.7	30.0
Order picking accuracy*	99.3	Greater than 99.9%	26.3	31.3
Warehouse damage (100%-damage)	1.0	Less than 0.56%	49.3	20.0
Time Metrics	Median	Best Practice Defined As	2005	2006
On time receipts*	95.0	Greater than 99%	15.4	23.4
On time shipments*	98.0	Greater than 99.5%	19.8	23.3
Average time from order placement to order shipment	24.0	Less than 5 hours	37.5	9.1
Productivity Metrics	Median	Best Practice Defined As	2005	2006
Cases shipped per person	99.9	Greater than 250	22.4	20.6
Lines shipped per person	25.9	Greater than 82	20.3	18.4
Pallets shipped per person	21.0	Greater than 33	17.3	19.2
Employee productivity versus standard	95.0	Greater than 108.1%	9.4	20.0
Productive hours to total hours	85.8	Greater than 95%	7.0	20.6
Average warehouse capacity used	85.0	Greater than 92%	23.2	20.3
Peak warehouse capacity used	95.0	Greater than 100%	42.7	24.8
Equipment/forklifts capacity used*	62.5	Greater than 87.0%	21.3	20.8
Honeycomb %	75.0	Greater than 90%	23.1	20.8
Average cubic capacity used	79.0	Greater than 91.2%	17.1	18.2
Financial Metrics	Median	Best Practice Defined As	2005	2006
Overtime hours	7.0	Less than 3.0%	12.2	17.9
Days raw material on hand	30.0	Less than 10.8 days	24.6	20.0
Days of finished goods inventory on hand	35.0	Less than 14	16.0	17.0
Distribution costs per unit shipped	1.6	Less than 0.6%	50.0	15.8
Average days sales outstanding (accounts receivable)	38.0	Less than 18	11.0	19.5
Distribution costs as a % of sales	5.0	Less than 2.1%	22.4	14.6
Direct distribution cost % of total cost	8.5	Less than 2.5%	12.5	20.0
Indirect distribution cost % of total cost	7.0	Less than 1.2%	21.4	20.0
Administrative cost % of total cost	10.4	Less than 1.8%	10.4	14.3
Gross margin % of total cost	30.0	Greater than 58.0%	4.8	21.1
Net margin %	10.0	Greater than 20.7%	15.6	18.8
Lost sales (% of SKU stocked out)	3.0	Less than 1%	12.5	13.1
Average value of backorders as a % of sales	4.0	Less than 1%	5.0	6.8
Value added per employee	50.0	Greater than 97.9%	50.0	18.2

Note: * indicates statistically significant differences were found between 2005 and 2006.

In this table,
"best practice"
is set by 2006
respondents.

**In Table 4,
the best
practice was
set by the top
20% of 2005
respondents.**

Table 4. Best Practice Performance Based on 2005 Standard

Quality Metrics	Median	Best Practice Defined As	2005	2006
Fill rate – line*	96.0	Greater than 99.0%	28.0	30.7
Fill rate – order*	96.0	Greater than 99.0%	24.0	36.3
Percent of orders shipped complete*	96.0	Greater than 99.0%	29.8	35.4
Inventory shrinkage as a % of total inventory*	0.3	Less than 0.01%	19.1	0.0
Perfect Order Index	96.5	Greater than 99.3%	19.6	20.2
Backorders (back orders as a % of total orders)	5.0	Less than 2.0%	14.3	21.3
Annual work force turnover	10.0	Less than 3.4%	19.6	15.3
% of orders sent damage free*	99.6	Greater than 99.9%	20.0	4.0
% of orders with correct invoice	99.0	Greater than 99.9%	17.6	18.6
Inventory count accuracy	99.0	Greater than 99.8%	20.6	19.4
Order picking accuracy*	99.0	Greater than 99.8%	26.3	31.3
Warehouse damage (100%-damage)	0.3	Less than 0.01%	31.3	0.0
Time Metrics	Median	Best Practice Defined As	2005	2006
On time receipts*	92.0	Greater than 98%	25.8	36.0
On time shipments*	98.0	Greater than 99.3%	19.8	23.9
Average time from order placement to order shipment	24.0	Less than 4.2 hours	37.5	9.1
Productivity Metrics	Median	Best Practice Defined As	2005	2006
Cases shipped per person	110	Greater than 251.6	20.0	11.8
Lines shipped per person	21.0	Greater than 90	20.3	18.4
Pallets shipped per person	19.0	Greater than 28	21.2	38.5
Employee productivity versus standard	95.5	Greater than 104.4%	18.8	25.0
Productive hours to total hours	85.0	Greater than 90%	31.6	37.6
Average warehouse capacity used	85.0	Greater than 93.4%	19.7	17.1
Peak warehouse capacity used	97.0	Greater than 104.4%	19.7	11.0
Equipment/forklifts capacity used*	75.0	Greater than 90.0%	21.3	12.5
Honeycomb %	76.5	Greater than 90%	23.1	20.8
Average cubic capacity used	85.0	Greater than 90.0%	34.1	22.7
Financial Metrics	Median	Best Practice Defined As	2005	2006
Overtime hours	9.0	Less than 4.0%	16.1	22.2
Days raw material on hand	20.0	Less than 10 days	18.0	16.0
Days of finished goods inventory on hand	31.0	Less than 14	16.0	17.0
Distribution costs per unit shipped	0.5	Less than 0.09%	16.7	0.0
Average days sales outstanding (accounts receivable)	35.0	Less than 24.6	19.5	26.6
Distribution costs as a % of sales	3.6	Less than 1.6%	19.4	12.0
Direct distribution cost % of total cost	8.5	Less than 3.0%	15.6	20.0
Indirect distribution cost % of total cost	6.5	Less than 1.0%	14.3	6.7
Administrative cost % of total cost	7.9	Less than 2.8%	18.8	35.7
Gross margin % of total cost	24.5	Greater than 40.8%	19.4	36.8
Net margin %	9.4	Greater than 20.0%	20.3	18.8
Lost sales (% of SKU stocked out)	3.0	Less than 1.3%	16.1	23.4
Average value of backorders as a % of sales	2.5	Less than 1.4%	20.0	24.3
Value added per employee	92.0	Greater than 112.0%	16.7	9.1

Note: *indicates statistically significant differences were found between 2005 and 2006.

Topping Out the Measures List

What measures are most commonly used in the DC? Most popular measures were found by counting the number of times a certain measure was used and then dividing by the most often used metric. In 2006, on time shipments was the most often used metric.

There are two interesting findings from this analysis. First is the similarities in measures from 2005 to 2006. Performance on many was relatively flat. The second finding is that reported improvements were targeted to better meet the needs of the customer. Of the measures that showed improved performance compared to 2005, all of them directly impact a customer.

Improvements that are taking place appear to be focused on better meeting the needs of current customers, before they become a former customer. As such, we are an advocate of customer benchmarking.

Customer Benchmarking

We are often asked “How good is good?” Perhaps the real question should be “How good do I have to be based on my customer requirements?” That benchmark of performance can only come from customers.

How good are this year’s respondents? According to the figures below, overall performance is holding steady. Three measures showed an increase in performance compared to last year: fill rate, cycle time and perfect order performance.

Perfecting the Perfect Order

Firms must work on the process of how they deliver goods and services to a customer to truly be effective. This focus on better meeting the needs of customers was translated into action in the form of the perfect order.

What does it mean to be perfect? A widely-recognized and recommended measure that combines a number of these key metrics is the Perfect Order Index (POI). For our purposes,

we define the perfect order index as consisting of four measures:

1. Complete
2. On-time delivery
3. Damage free
4. Correct documentation and pricing/invoicing

To calculate the index, each of the four measures are multiplied by each other. For instance, if you were performing at a 95% level in all four measures, your perfect order index would be 81.5% (95 x 95 x 95 x 95).

Table 5. Most Popular Measures Used – 2006

Description	2006 Use	Performance Compared to 2005
On time shipments	100%	No change
% of overtime hours	91.5%	No change
On time receipts	91.1%	No change
% of orders shipped complete	89.9%	Improved
Average time from order placement to order shipment	88.2%	No change
Fill rate – line	84.3%	Improved
Fill rate – order	83.9%	Improved
Inventory count accuracy	83.0%	No change
Units picked per hour	82.3%	Decrease
On time delivery	80.9%	N/A
Order picking accuracy	76.4%	Improved
Average warehouse capacity used	72.8%	No change
Days of finished goods inventory on hand	72.8%	No change
Annual workforce turnover	70.5%	No change

Note: The base used to calculate percentages was 340 usable responses.

Table 6. Different Definitions Yield Different Results

Perfect Order Index Defined As:	Components Multiplied		Components Averaged	
	2006	2005	2006	2005
Index with all four components	85.7%	85.5%	96.2%	96.1%
Index with three components	86.9%	87.5%	95.1%	95.7%
Average for all respondents	85.9%	86.6%	96.1%	95.9%

Figure 6. Customers Say My Fill Rate Is:

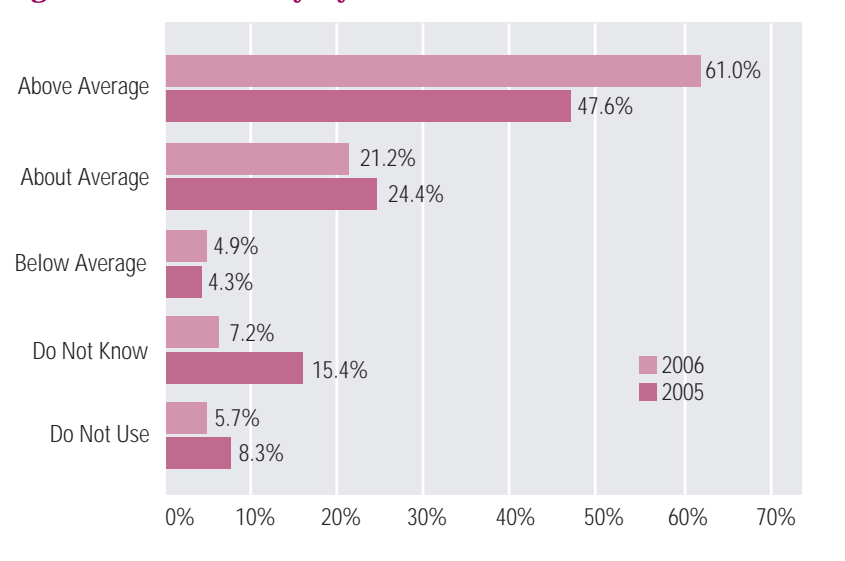


Figure 7. Customers Say My On Time Delivery Is:

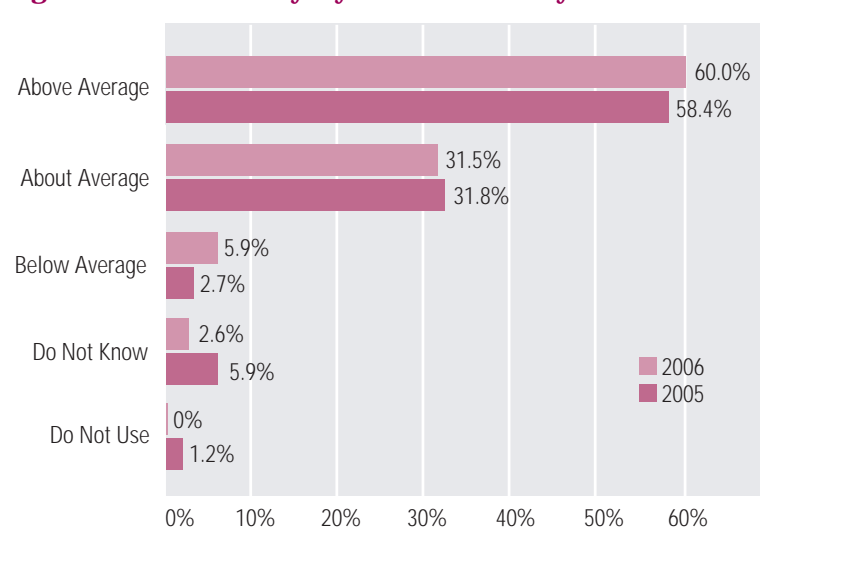
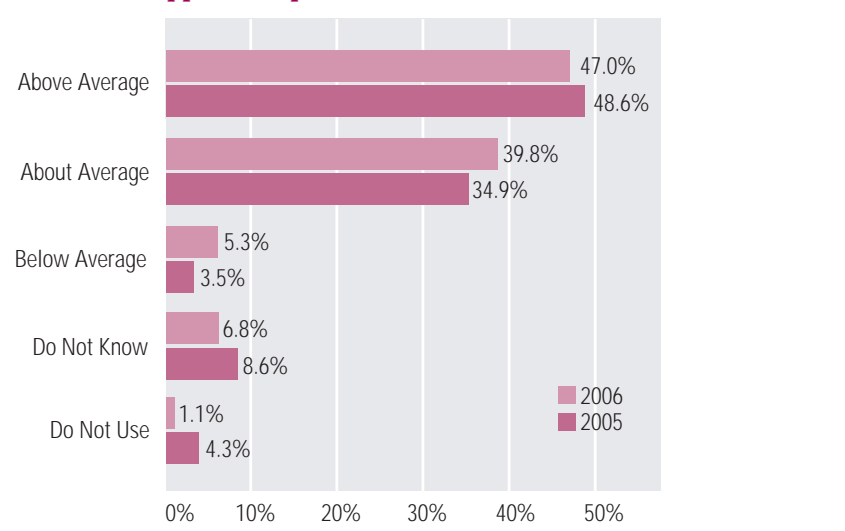


Figure 8. Customers Say My Orders Shipped Complete Performance Is:



As we noted last year, defining the perfect order index in a consistent manner can be challenging for many companies. As such, we asked companies to report their performance against the individual metrics and we calculated the index.

So where is the perfect order index at in 2006? We requested all four measures from the respondents, so we were able to calculate the index. Because we didn't have complete data, care was taken to provide a response based on all four metrics, as well as three. For illustration purposes, the average of the measures is provided, and it is this analysis that we believe results in an over-reporting of the index on the survey.

Fuzziness Over On Time

Again this year, we find that more of the respondents measure "on-time shipment," rather than "on-time delivery." One reason may be that tracking when an order ships is a simple matter; it's much tougher to obtain reliable data on precisely when the order was delivered. And, given our respondent base of DC managers, it could be that this measure more accurately reflects their daily responsibilities.

Perhaps a bigger issue is the apparent lack of consensus regarding what constitutes "on-time" delivery. When asked whether their customers defined on-time delivery differently, nearly 69% responded "yes."

How much variation could there possibly be in the definition of "on time?" Apparently, quite a lot. Many respondents (63.1%) indicated their customers simply defined an on-time delivery as a **delivery on the requested or agreed-upon day**. But others were more exacting. 26.9% of the respondents said that "on time" meant **delivery at an appointed time, or at least within a 30-minute window of that appointed time**. Still others reported different definitions, including "No line down time" or "By 4:00PM" This lack of agreed-upon standards and definitions goes a long way toward explaining why some suppliers have difficulty delivering "on time."

The largest block of responses (35.5%) indicate customers feel that on time delivery means **on the requested day**. While getting product on time with regards to the specific day is the most common definition, over 36% define on time delivery as being related to more specific appointment time (ranging from within 1 hour of the appointment time to within 15 minutes of the appointment time). Table 7 provides a breakdown of the definitions and performance for the measure “on time delivery.”

Table 7. Definitions/Performance for On-Time Delivery

	2006	2005
On or before appointment time	15.8%	16.2%
+15 minutes from the appointment time	4.3%	4.5%
+30 minutes from the appointment time	6.8%	10.5%
+1 hour from the appointment time	10.0%	8.9%
On the requested day	35.5%	44.1%
On the agreed upon day	27.6%	15.8%

Measures Vary Based on DC Demographics

As noted at the beginning of the report, we analyzed the data further by looking for differences based on industry type, type of operation, primary customer, size and strategy. The research team believes that measures need to be taken in context. In other words “like companies” should be benchmarked against other “like companies.”

For instance, suppose a person decided to start going to the gym. One of the first considerations is to determine goals. Is it to build upper body strength? Is it to lose weight? To work on cardiovascular systems? The answer determines the exercises employed and the benchmarks set.

To better understand the results of the study, we segmented the findings based on several key attributes. Each of these are described and presented below.

Figure 9. Customers Say My Correct Invoice Performance Is:

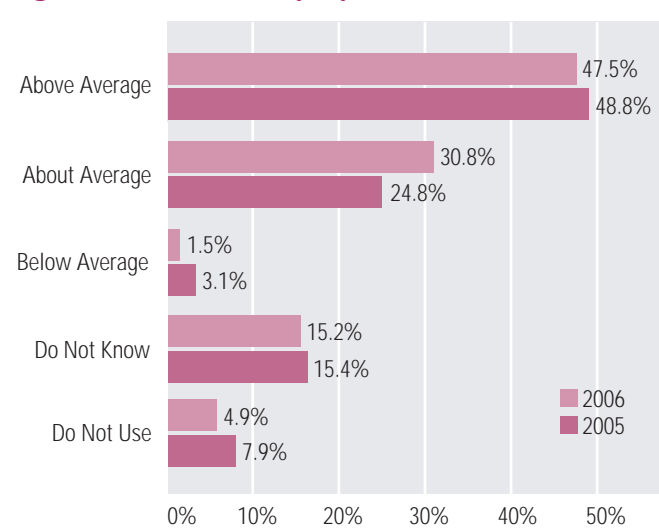


Figure 10. Customers Say My Perfect Order Performance Is:

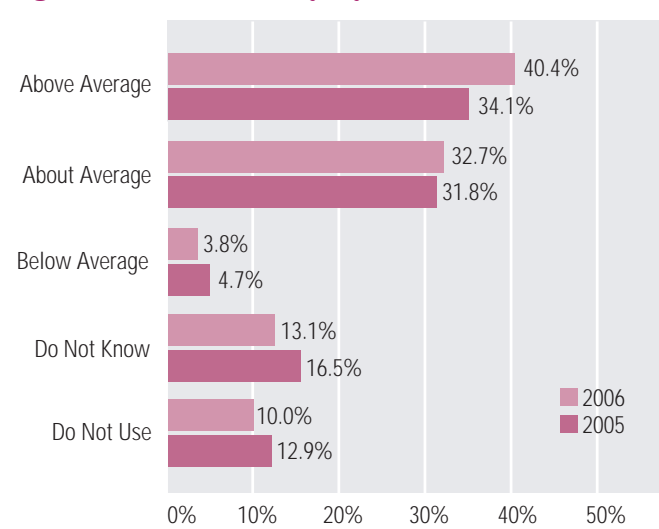
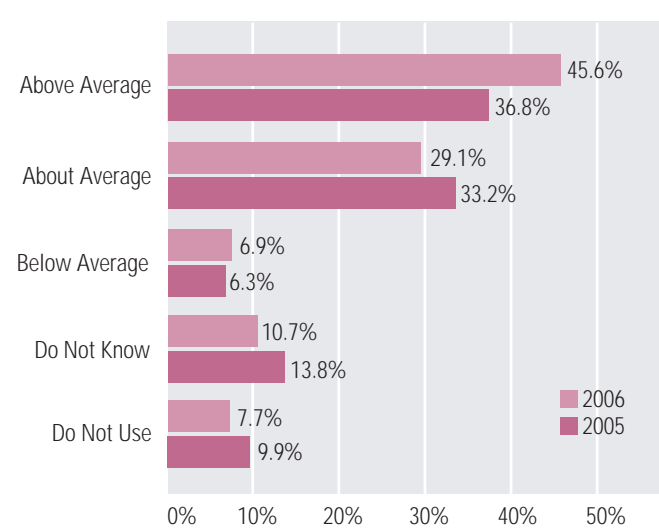


Figure 11. Customers Cycle Time (Order Fulfillment Lead Time) Performance Is:



Measures vary based on DC demographics.

Table 8. Median Performance of Most Popular Measures By Primary Customer

	Manufacturer	Distributor	Retailer	End Customer
On time receipts	98.5	95.0	94.8	95.0
On time shipments	99.0	98.0	98.0	98.4
Fill rate – line	98.1	96.1	98.0	97.0
% of orders shipped complete	98.3	97.5	97.5	98.0
% of overtime hours	6.4	10.0	7.7	6.5
Units picked per hour	86.0	99.9	120.0	78.0
Average time from order placement to order shipment	24.0	24.0	24.0	14.0
Days of finished goods inventory on hand	30.0	35.5	40.0	30.0
Annual workforce turnover	10.0	12.0	10.0	10.0
Average warehouse capacity used	84.0	84.5	85.0	85.0
Inventory count accuracy	99.6	99.5	99.0	99.0
Order picking accuracy	99.5	99.2	99.0	99.4
Fill rate – order	98.5	96.7	98.0	97.2
Percent of orders delivered on time	98.0	95.0	98.0	96.8
Percent of orders shipped complete	99.0	95.0	97.0	98.2

Note: there were no statistically significant differences among groups based on primary customer.

Table 9. Median Performance of Most Popular Measures By Sales

	< \$500 Million	\$500 Million - \$3 Billion	> \$3 Billion
On time receipts	95.0	95.0	95.4
On time shipments*	98.0	98.0	98.0
Fill rate – line*	97.0	98.0	97.6
% of orders shipped complete	98.0	98.0	97.2
% of overtime hours	6.0	7.3	8.0
Units picked per hour	99.9	99.9	107.5
Average time from order placement to order shipment*	16.0	24.0	24.0
Days of finished goods inventory on hand	30.0	35.0	35.5
Annual workforce turnover	10.0	10.0	7.5
Average warehouse capacity used	85.0	82.0	80.0
Inventory count accuracy	99.1	99.0	99.6
Order picking accuracy*	99.2	99.0	99.4
Fill rate – order	98.0	98.5	98.0
Percent of orders delivered on time*	97.5	95.9	95.0
Percent of orders shipped complete	98.0	97.0	98.2

Note: * indicates statistically significant differences were found among groups

Key Measures by Industry Segment

Table 10 presents the three most popular measures employed for each industry segment. We have also included specific benchmarks and best practice values for each measure where there were enough responses.

Of course, this doesn't answer a critical question: are some industries more likely to use some measures than others? Differences in the usage of the measures and industry sectors are noted. For instance, the research team found that some metrics such as "On time shipments" were used across most industries. However, other measures such as "On time receipts," was only found in one industry sector as a top three metric (Transportation Service Provider).

The findings suggest that certain industries such as Manufacturing/Distribution—Consumer Products and MFG/DIST – General have very different objectives regarding inventory and order management. Where one is mostly small broken case shipments with a focus on high volume of orders and on-time shipments, the other is more concerned with production-related issues such as raw material management and bulk or pallet shipments.

Table 10. Key Measures Used By Industry

Industry	Measure Used	Benchmark	Best Practice Range
MFG/DIST – General	% of overtime hours	6%	0.1 - 2.5%
	On time shipments	95.9%	99.6 - 99.9%
	Order picking accuracy (% by order)	99%	99.8 - 100%
MFG/DIST – Consumer Products	On time shipments	97.8%	99 - 100%
	Inventory count accuracy (% by units)	99.4%	99.8 - 100%
	% of orders shipped complete	97.2%	99 - 100%
MFG/DIST – High Technology	Inventory count accuracy (% by units)	99.7%	98%
	Inventory shrinkage as a % of total inventory	NS	NS
	On time shipments	96%	98 - 98.4%
MFG/DIST – Automotive	On time shipments	99%	99.8 - 100%
	% of orders shipped complete	91.2%	99 - 99.9%
	Fill rate-line	97%	98 - 99.9%
Utilities/Government	% of hours without accident	99%	100%
	% of orders shipped complete	80%	96%
	Inventory count accuracy (% by units)	98.5%	99%
Life Sciences – Pharmaceuticals	On time shipments	98%	99 - 100%
	Fill rate-line	99.7%	99.9 - 100%
	Fill rate-order	94%	99.1 - 99.9%
Life Sciences – Medical Devices	Fill rate-order	57.1%	99.3 - 99.9%
	Order picking accuracy	99%	99.9%
	Inventory count accuracy (% by units)	99%	99.9 - 100%
3rd Party Warehouse	% of orders sent damage free	99.4%	99.9 - 100%
	On time shipments	99%	99.8 - 100%
	Inventory count accuracy (% by units)	99.5%	99.5 - 100%
Transportation Service Provider	On time receipts	98.3%	99 - 100%
	On time shipments	98.3%	99%
	% of orders shipped complete	99.7%	100%

NS: not sufficient data to provide benchmark.

Table 11. Differences in Key Measures Used By Industry

Measure	Most Used	Least Used
On time shipments	<ul style="list-style-type: none"> • Mfg/dist-Consumer Products • Third Party Warehousing 	Utilities/Government
% of overtime hours	Mfg/Dist-Consumer Products	Utilities/Government
On time receipts	Third Party Warehousing	Mfg/Dist – General
% of orders shipped complete	Mfg/Dist-Consumer Products	Mfg/Dist – General
Average time from order placement to order shipment	Mfg/Dist-Consumer Products	<ul style="list-style-type: none"> • Utilities/Government • Transportation Services
Fill rate – line	<ul style="list-style-type: none"> • Mfg/Dist-High Tech • Mfg/Dist-Consumer Products 	Transportation Services
Fill rate – order	Mfg/Dist-Consumer Products	Mfg/Dist – General
Inventory count accuracy	<ul style="list-style-type: none"> • Mfg/Dist-Consumer Products • Life Sciences – Devices 	<ul style="list-style-type: none"> • Mfg/Dist – General • Transportation Services
Units picked per hour	<ul style="list-style-type: none"> • Mfg/Dist-High Tech • Mfg/Dist-Consumer Products 	<ul style="list-style-type: none"> • Utilities/Government • Transportation Services

Measures by Position in the Supply Chain

Most firms are a part of complex supply chains, many of which have become international in scope. The research team believes that a company's position in the supply chain played a role in the measures they used. Therefore we performed additional analysis of the measures used based on the responding company's position in the supply chain. To accomplish this we asked the respondent to identify their company's primary customer.

As in our previous studies, we found that location does play a key role—with different “supply chain segments” placing different priorities on the measures they use. We also found that there were some differences in the top-rated metrics for each when the 2006 study is compared to 2005.

The data was analyzed two ways. First, as noted in Table 12, the most common measures used by location in the supply chain are noted below. Second, the data was analyzed to find where these measures are most commonly used (Table 13).

Table 12. Measures Used Based on Supply Chain Position	
Primary Customer	Measure Used in 2006
Manufacturer	% of orders sent damage free
	On time shipments
	Average time from order placement to order shipment
Distributor	Inventory count accuracy
	On time shipments
	% of orders shipped complete
Retailer	On time shipments
	% of overtime hours
	Units picked per hour
End User/Customer	% of overtime hours
	On time shipments
	% of orders shipped complete

As shown in Table 12, there is considerable overlap as to the measures used by the respondents. All four use “on time shipments” and two each use either “% of orders shipped complete” or “% of overtime hours” as key measures.

Table 13 indicates that it is clear that the tip of the supply chain is more focused on making sure that the product arrives at the time expected. Retailers have worked to shed inventory from their supply chains and are expecting more from their suppliers. This focus will continue farther upstream as distributors work to reduce their costs and lean their operations.

Table 13. Measures Used Based on Supply Chain Position and Customer

Measure	Most Used For	Least Used For
On time shipments	Retail firm	End Customer
% of overtime hours	Retail firm	Manufacturer
On time receipts	Retail firm	End Customer
% of orders shipped complete	Retail firm	Manufacturer
Average time from order placement to order shipment	Retail firm	Distributor

Retailers have worked to shed inventory from their supply chains and are expecting more from their suppliers.

Impact of Business Strategy on Measures

Does a firm’s strategy have an impact on the types of measures used? Shouldn’t those firms that say they are “cost leaders” have different measures than those that are “product/market innovators?” Table 14 presents the top measures used by business strategy.

Table 14. Measures Used Based on Business Strategy

Business Strategy	Measure Used
Cost Leadership	On time shipments
	% of overtime hours
	% of orders sent damage free
Customer Service	On time shipments
	% of overtime hours
	Inventory count accuracy
Product / Service Innovation	On time shipments
	% of orders shipped complete
	On time receipts
Mix – Be All Things to All People	On time shipments
	% of overtime hours
	Inventory count accuracy

Of the measures used, which are statistically significantly? In other words, based on the firms’ strategy, which measure(s) are mostly likely or least likely to be used by the company? These results are found in Table 15. Table 16 provides a comparison of the median for each of the four categories.

Table 15. Most / Least Used Measures Based on Business Strategy

Measure	Most Used With Strategy	Least Used With Strategy
On time shipments	Product/Market Innovation	Mix-Be All Things
% of overtime hours	Cost Leadership	Product/Market Innovation
On time receipts	Product/Market Innovation	Mix-Be All Things
% of orders shipped complete	Product/Market Innovation	Customer Service
Average time from order placement to order shipment	Product/Market Innovation	Customer Service

Table 16. Median Performance of Most Popular Measures By Strategy

Measure	Cost Leader	Customer Service	Product Differentiation	Mix: Be All Things To All People
On time receipts	95.0	95.4	95.0	95.0
On time shipments	98.0	98.0	98.0	98.6
Fill rate – line	96.2	98.0	98.5	97.0
% of orders shipped complete	97.6	98.0	98.8	98.0
% of overtime hours	7.9	8.0	4.0	7.0
Fill rate – order	97.1	98.0	98.7	97.3
Units picked per hour	99.9	107.0	170.0	99.9
Average time from order placement to order shipment	18.0	12.0	42.0	24.0
Days of finished goods inventory on hand	37.0	30.0	36.0	39.0
Annual workforce turnover	6.0	10.0	10.8	12.0
Order picking accuracy	99.0	99.2	99.3	99.4
Average warehouse capacity used	82.0	85.0	85.0	84.0
Percent of orders delivered on time	97.3	97.5	95.0	96.8
Percent of orders shipped complete	98.5	98.0	95.0	97.8

Note: there were no statistically significant differences among groups based on strategy

Impact of Operations on Measures

How often have we heard that the type of operations we have will impact performance? While there are definite operational differences among these four groups, and how actual performance is obtained, there are relatively few differences in the actual results. Table 17 presents the top measures used by business strategy.

Table 17. Median Performance of Most Popular Measures By Type of Operation

	Full Case	Full Pallet	Broken Case	Broken Pallet
On time receipts	94.5	98.0	95.0	92.3
On time shipments*	98.0	98.0	98.5	98.0
Fill rate line	98.0	98.0	97.0	97.0
% of orders shipped complete	98.0	98.0	98.0	97.5
% of overtime hours	8.0	10.0	5.0	8.0
Units picked per hour	147.0	111.5	89.0	99.9
Average time from order placement to order shipment	24.0	24.0	16.0	36.0
Days of finished goods inventory on hand	34.0	25.0	40.0	34.5
Annual workforce turnover	11.0	10.0	10.0	5.0
Average warehouse capacity used	80.0	85.0	82.5	82.0
Inventory count accuracy	99.0	99.5	99.2	99.1
Order picking accuracy	99.0	99.4	99.5	99.0
Fill rate – order*	98.0	98.2	97.6	97.5
Percent of orders delivered on time	97.3	96.5	98.0	93.6
Percent of orders shipped complete	98.0	98.5	95.5	97.5

Note: * indicates statistically significant differences were found among groups

Senior Management Interest

One question was related to any change in the level of interest in measures on the part of senior management. Respondents indicated that 69.5% of their company's senior management exhibited an increase in attention to measures, up from 66% in 2005.

Table 18. Senior Management Interest in Measures—2006

Decreasing	Staying the Same	Increasing
3.5%	27.0%	69.5%

Benchmark Drill Down – Top Three Measures

While it is nice to know the “Median” and the “Best Practice” performance, the following tables provide details for the three most frequently used measures.

Best Practice for Top Measures On Time Shipments

Greater than 99.5%	23.3%
98.7 - 99.5%	16.7%
97.1 - 98.7%	20.0%
93.2 - 97.1%	20.0%
Less than 93.2%	20.0%

Best Practice for Top Measures Overtime Hours

Less than 3.0%	24.0%
3 - 5%	17.2%
5 - 10%	29.4%
10 - 12%	11.5%
Greater than 12%	17.9%

Best Practice for Top Measures On Time Receipts

Greater than 99%	23.4%
96.2 - 99%	16.5%
90.8 - 96.2%	20.1 %
85 - 90.8%	23.0%
Less than 85%	16.9 %

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Closing Remarks—Call to Action

Overall, what we see from this survey is encouraging. There continues to be improvement in the use of measures by companies.

Our first call to action is to recommend that specific industry groups mount an effort to identify and disseminate those measures that seem to be specific to their members. They could work within their membership, and with non-member companies who are a part of their industries to gather and disseminate benchmark data that can be used to evaluate performance against the group.

Our second call to action for companies is for DC professionals to begin to stretch their thinking and broaden their perspective to look at measures that are more strategic/cross functional in nature and support the “voice of the customer” rather than their internal capabilities.

For example, the focus on “on time shipments” versus “on time deliveries” or the Perfect Order Index supports the fact that what is being measured is often what is in the span of control/what is easy to measure. We see that in many cases

the measures may be useful to a specific organization or department, but may not necessarily be shedding light on true performance against customer requirements. The obvious danger here is that while the specific unit may feel good about its own performance, the rest of the company may be suffering as a result.

Acknowledgements

We would like to thank several individuals for their support of the research project. From WERC, we would like to thank Bob Shaunnessey for his support of the project. Both Rita Coleman and Michael Moss were invaluable for their edits and work to send the e-blast to the WERC membership. Mitch Mac Donald and Peter Bradley played a key role at *DC Velocity*. Steve Murray with Supply Chain Visions helped in analyzing the data. Finally, Eugene Pierce and Chad Ingersoll helped in the construction and maintenance of the survey web site, and Ryan Santoo at Georgia Southern University assisted with the initial data analysis. To all we give our thanks. ■



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