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A Periodic Assessment
of Industry Trends

PROVIDED BY AND FOR THE WAREHOUSING PROFESSIONAL



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

DC Measures 2010



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This is the seventh year of the Warehousing Education and Research Council (WERC) and *DC Velocity*'s "Annual Warehouse Benchmarking Study." As in previous years, the study results and analysis are compiled and presented by our partners at Georgia Southern University and Supply Chain Visions, two widely respected organizations in the area of performance management and measurement.

Focus of this study

The heart of this study is to help practitioners gain a better understanding of key distribution metrics and report how performance has changed over time. Over the years the study has focused on various themes; for instance, highlighting the importance of the perfect order or tracking significant changes in measures over the past five years. This year we wanted to compare the performance of bad warehouses to good warehouses. We will look at those metrics that have the most significant performance gaps and discuss some of the processes that could lead to overall improvement. > [pg. 2](#)

Continuing Improvement

Overall, what we see from this year's survey is encouraging. Despite one of the worst economic environments in over 20 years, we see continued improvement in the use of measures by companies. And it is equally encouraging to see that executives continue to support measurement as a key practice in most organizations. A few comments about the findings from this year's study.

First, there is a continued shift from taking a balanced approach to measures to focusing on the internal operations of the warehouse, first noted last year. Firms may still feel the need to cut costs and become more efficient in the short term. However, losing sight of the customer could cause reductions in loyalty or satisfaction ([Figure 7](#)). Whether this is a quick fix or not for the current economic conditions, losing sight of your strategy will hurt financial performance long term.

Second, the performance gap between best-in-class and major opportunity still remains large. The culprit is not going beyond the numbers. The best-in-class performers did not attain this status serendipitously. They do not simply use benchmarking data to set targets. They tend to look behind the numbers to understand how their level of performance was reached by identifying the unique processes, tools, and methods required to achieve best-in-class performance.

Paying attention to just quantitative benchmarks, or just focusing on your performance, will not close your performance gap. The next step in benchmarking, focusing on processes or qualitative benchmarking, must be taken in order to achieve best-in-class status. > [pg. 15](#)



"We are continually pleased with the interest in the metrics survey."



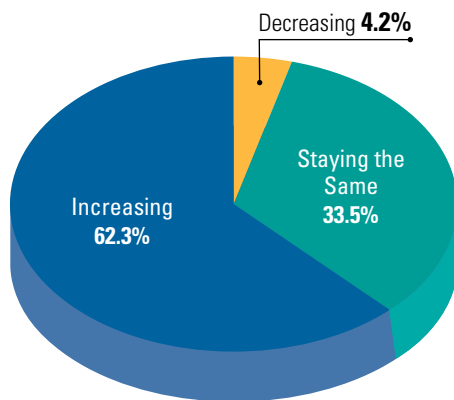
About the Study

This survey was launched via an email invitation to WERC members and DC Velocity readers in early January 2010. Survey participants are asked to report their actual levels of performance for 2009. The study captures 50 key operational metrics that are close to the heart of most distribution center professionals. The measures have been grouped into 5 balanced sets—customer, operational, financial, capacity/quality and employee—plus the additional sets related to perfect order and cash-to-cash cycle measurement.

Senior Management Interest in Performance Measures

We are continually pleased with the interest in the metrics survey. In part, we believe that it is due to senior executives' interest in how well their supply chain is performing relative to everyone else. One of the annual questions asks about the level of interest in measures on the part of senior management. The results show that 62% of respondents say executives' interest is increasing—certainly good news! (Figure 1)

FIGURE 1. INTEREST IN MEASURES ON PART OF SENIOR MANAGEMENT FOR 2010



To Benchmark or Not To Benchmark?

It is easy to have a self-inflated view of your DC's performance. Most of us, if asked about our work ethic, would say we are above average. Yet, with a simple understanding of math we know that not everyone is above average; someone has to be below the mean. We refer to this as the 50% syndrome. The syndrome occurs when a person has a self-inflated perception of their DC's performance. Some refer to it as the "Lake Wobegone Syndrome" where all the kids are above average.

To understand the implications, let's examine a single metric: on time delivery. We know it is a tough metric to nail down because so many customers have different definitions of on time performance.

In order to test respondents' understanding of their reported performance, we asked respondents to indicate what customers would say about how well they are performing on the metric. As Table 1 indicates, 81.8% rated themselves as average or above average.

TABLE 1. WHAT CUSTOMERS SAY ABOUT SURVEY RESPONDENT'S PERFORMANCE REGARDING ON TIME DELIVERY

Customer View of Performance	Percent of Respondents
Above Average	57.6%
Average	24.2%
Below Average	2.3%
Do Not Know	8.3%
Do Not Use	7.6%

This is where the 50% syndrome comes into play. Statistically only 50% of firms can have "average or above average" performance¹. However, 81.8% of the survey respondents reported average or above average performance.

How? There are a few explanations:

- The group of companies responding to the survey are above average.
- The data for on time delivery may be so hard to capture that companies are reporting estimated information.

The first explanation may actually carry some weight. The respondents are members of WERC or read *DC Velocity*. They are interested in self improvement and learning how to do their jobs better. And they were willing to take the time to respond to the survey. That does put them in a smaller subset of both overlapping groups—and one that could be better than average. If that is the case, then non-respondents may be performing at even lower levels, which is not a happy thought.

The second explanation has to be considered. Hard to come by data leads us to make an estimate, and that may not be accurate. Yet, as shown in Tables 2-3, respondents have a consistently high view of their performance.

TABLE 2. WHAT CUSTOMERS SAY ABOUT SURVEY RESPONDENT'S PERFORMANCE REGARDING CORRECT INVOICE

Customer View of Performance	% of Respondents
Above Average	51.6%
Average	21.0%
Below Average	0.8%
Do Not Know	10.5%
Do Not Use	16.1%

¹A note for the mathematically precise: we are assuming a normal distribution in this case, where the median and the mean are the same. If not, we'd use the median.

TABLE 3: WHAT CUSTOMERS SAY ABOUT SURVEY RESPONDENT'S PERFORMANCE REGARDING CYCLE TIME

Customer View of Performance	Percent of Respondents
Above Average	39.8%
Average	27.6%
Below Average	3.3%
Do Not Know	8.1%
Do Not Use	21.1%

Note: Due to rounding, numbers do not add up to 100%

Of course, one other option is that the respondents were mistaken. If we didn't have familiarity with a customer's expectations, perhaps we'd give ourselves the benefit of the doubt. Or, we could just think of our most satisfied customer and think that everyone is just like them.

While we don't know the right answer, we do have an opinion and a suggestion. Our suggestion is to be interested in the benchmark. All companies should benchmark to better understand how they are performing relative to others. Evidence is better than feelings, especially in metrics. If you are just beginning your benchmarking journey, we recommend reading WERC's *Warehouse Manager's Guide to Benchmarking*.

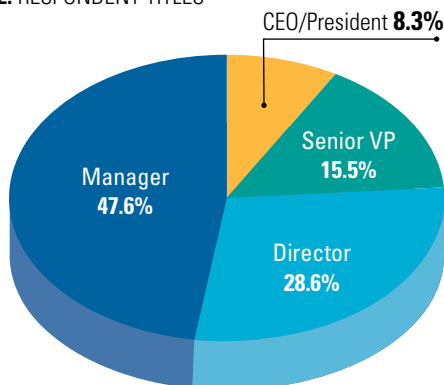
Respondents Represent Diverse Industries, Operations and Firm Sizes

This year over 613 individuals responded to the survey. Of these, 559 provided usable responses that are included in this analysis. The largest group of respondents reported their title as Manager (47.6%), while Director (28.6%) and Senior VP (15.5%) were the second and third largest groups. Executive level responses more than doubled this year to 8.3% (Figure 2). This is one indication that warehousing executives are paying particular attention to measuring warehouse performance.

In addition to understanding who participated in the study, we reviewed five unique demographic areas, including:

1. Type of industry
2. Type of operation
3. Type of customer
4. Business strategy
5. Size of company

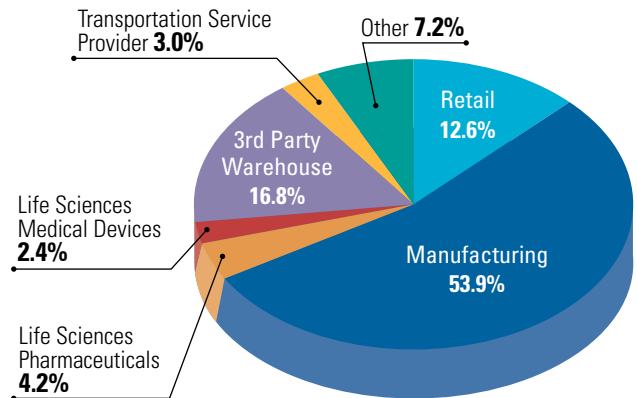
FIGURE 2. RESPONDENT TITLES



Demographics by Industry Type

Figure 3 provides a breakdown of the various business segments that participated in the study. As with previous years, the manufacturing/distribution industry segment remains the largest demographic base for the study. This is the largest manufacturing/distribution has been since the 2005 study. However, it is no surprise given the nature of the study to benchmark warehousing and distribution operations.

FIGURE 3. RESPONDENTS BY INDUSTRY



Because the manufacturing/distribution segment is so large, a further breakdown and explanation of the types of industries falling under the manufacturing/distribution segment is in Table 4.

Interestingly, the respondents in 2010 compare well with 2009. One major difference is that respondents in manufacturing increased by 4% and the 'other' category decreased by a similar amount.

TABLE 4. MANUFACTURING INDUSTRY BREAKDOWN

Business Segment	Further Industry Breakdown	Percent
Manufacturing	Consumer Products	27.5%
	High Technology	5.4%
	Automotive	2.4%
	Aerospace/Defense	0.6%
	General	18.0%

Demographics by DC Operation

Respondents also were asked how goods moved through their DC. As shown in Table 5, the majority of facilities (65.2%) are picking cases rather than pallets.

In calculating percentages for the type of work performed, we only used responses where a majority of the respondents' activity was in one of the four classifications.

Compared to 2009, pallet picking went up 7.4% in 2010. Most of that increase was in full pallet picking. Even though pallet

TABLE 5. RESPONDENTS BY DC OPERATION

Metric	% of Total	% Case vs. Pallet
Broken Case Picking	34.8%	65.2%
Full Case Picking	30.4%	
Partial Pallet Picking	12.2%	34.8%
Full Pallet Picking	22.6%	

picking increased, the good news is that inventory turns did not decrease in 2010, as might be assumed if customers were ordering larger quantities of products. Inventory turns increased from 2009 to 2010 for median and best-in-class. Inventory turns for the median increased from 8 turns in 2009 to 8.7 turns. Best-in-class increased from 16.4 in 2009 to 18.9 in 2010.

Type of Customer Served

Another important consideration is the location of the company within 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 4).

FIGURE 4. RESPONDENTS BY TYPE OF CUSTOMER

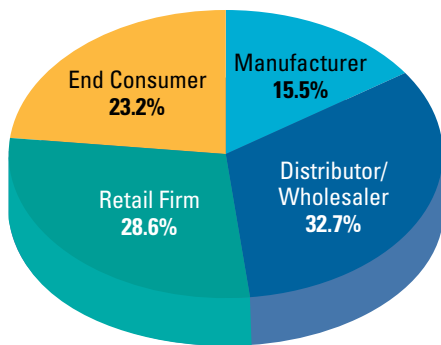
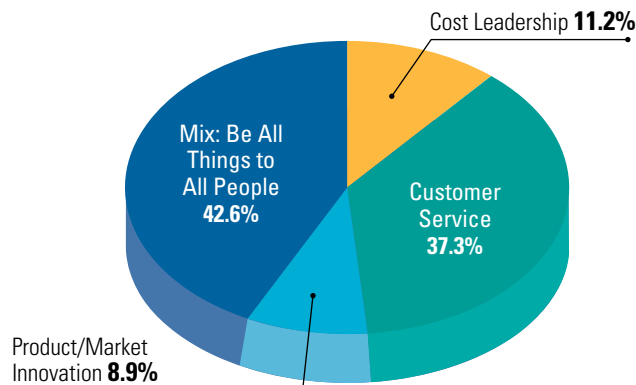


FIGURE 5. RESPONDENTS BY BUSINESS STRATEGY



As seen in previous studies, the majority of respondents reported that they were either at or near the end of the supply chain. This year is no exception in that over 50% of respondents reported their customers were either an end consumer or a retail firm.

What is interesting is that the number of respondents reporting Distributor/Wholesaler as their customer increased from 22.7% in 2009 to 32.7%, a change of over 44%. What decreased? Fewer respondents reported having an end consumer as their customer, down from 31.1% in 2009.

Business Strategy

The fourth demographic area is business strategy and it is another area that some suggest could impact measures in this year’s survey. Do different strategies place a higher emphasis on some measures and not on others? And at what level in the organization can 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 with respect to cost leadership, customer service, innovation or simply being all things to all people (Figure 5).

In prior years we have seen a continued growth in the number of respondents who say that their company strategy is a mix, trying to be “all things to all people.”

Last year was the first time the mix strategy actually decreased. However, on improved economic data from the waning months of 2009, it appears firms are moving away from focusing primarily on costs.

Which strategy did respondents move away from? Both Customer Service and Cost Leadership lost ground. Cost leadership dropped from 13.0% in 2009, suggesting that some companies are looking forward to a recovery and have shifted their focus either to Product/Market Innovation or to “being all things to all people.” Other companies are still facing difficult decisions because the economic outlook is still questionable even though the current environment has stabilized, which is why we are not seeing a sharper drop in those reporting Cost Leadership as their strategy. However, that hasn’t stopped some companies from being innovative. Product/Market Innovation had over an 11% increase from 2009 (8.0% to 8.9%).

This development will be interesting to watch. We believe once the economy stabilizes and begins to improve, more respondents will revert course and focus their attention back to “being all things to all people.”

Respondents were also asked about their operational management strategy with respect to outsourcing. Respondents were asked whether their global, domestic, and regional operations were managed internally or by a third party (Table 6). When compared to the 2009 study, there was a 27% increase in the ‘solely 3PL results’ category. This increase is most likely due to the strong showing 3PLs have had in the past two years in the survey.

Why this change? First, more companies are using 3PLs. This should surprise no one. This is the third straight year that this

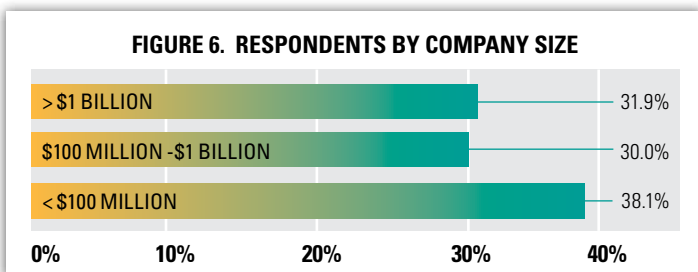
TABLE 6. HOW RESPONDENT DCs ARE MANAGED

Who Provided Responses	Percent
Solely 3PL Results	14.4%
Mix of Both 3PL and Internal Results	19.1%
Solely Internal Results	66.5%

percentage has increased. Respondents are still focused on reducing costs, and hoping that 3PLs can help them achieve this goal.

Demographics by Company Size

Each year respondents indicate the relative size of their company by using annual sales. The purpose of this question is to help determine what effect size had on the kinds and number of metrics used, in addition to creating additional benchmarks based on size (Figure 6).



Once again, we are pleased to see that companies of all sizes are participating in the study supporting our philosophy that companies should benchmark and focus on their performance regardless of their size. Companies with annual sales of less than \$100 million comprised just over 38% of our total respondents, while participants having greater than \$1 billion in annual sales comprise only 31.9% of the respondents. Those companies reporting annual sales between \$100 million and \$1 billion represent 30.0% of the respondents. So, we continue to have a good representation of the industry.

Because we continue to have a good representation by company size, we can compare performance and determine whether larger size companies perform better than smaller companies on various metrics.

Answering the Big Question

It is a question we hear all of the time. “Our industry is unique.” “We’re different.” “We’re special.” “Your metrics don’t apply to us because...”

The list goes on, but here is the quick answer. In the majority of cases, when it comes to DC performance, we don’t see statistically significant differences among firms based on any of the demographics listed above. Quantitative performance is quantitative performance. Are there differences? No doubt. These differences are primarily qualitative in nature. This is why we’ve stressed using both quantitative and qualitative benchmarking.

Some of you may disagree. If so, here is some good news. You can benchmark your performance on each of the metrics

online at www.werc.org and compare yourself to each of the demographics listed above. In other words, if you’d like to compare yourself to other firms with less than one hundred million dollars in sales, you can do so. You can compare yourself to the entire set of findings as well.

Interpreting the Benchmarking Results

A primary objective for this study is 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.

As in previous benchmark studies, we primarily looked at two benchmarks: **median performance** and **best practice performance**. We chose the median as it is not easily swayed by outliers. The benchmarking data is reported using a “quintile” format which presents the data on a five-point maturity scale that reflects where the respondents are situated with respect to the journey toward “best practice.”

It gives readers an improved tool for judging their own performance and what constitutes best practice. *To be considered best practice, the level of performance would have to fall within the top 20% of all respondents.*

How Good is the Data?

Given that the respondents are members of a premier warehousing and distribution association and/or readers of a leading distribution magazine, the benchmarks may be better than the general population of DCs.

It is also important to compare your performance with an appropriate set of partners. While not as important for comparing overall service level and customer-oriented key performance indicators, it is especially true when comparing productivity and cost type metrics. Ideally this would be a firm which is similar in size and in the same or similar business segment. For this reason, WERC provides a detailed benchmarking report that segments the benchmarking data by industry, company size, strategy, operations and type of customer.

What This Year’s Data Said

Table 7 provides a summary of all of the metrics from the 2010 study presented in seven columns.

- **Column 1: Metric**
This is the metric that is being examined (metric definitions can be found on pages 12-15).
- **Columns 2-6: Quintile Rankings**
These columns split all data responses into five equally divided groups. Each quintile ranking indicates 20% of the responses, with the five groups representing:
 - > **Major Opportunity:** Represents the lowest 20% of responses.
 - > **Disadvantage:** Responses in the 20-40th percentile.
 - > **Typical:** Responses in the 40-60th percentile.
 - > **Advantage:** Responses in the 60-80th percentile.
 - > **Best Practice:** Represents top 20% of all responses.
- **Column 7: Median**
The actual median performance of all respondents.

TABLE 7. QUINTILE PERFORMANCE CLASSIFICATIONS FOR METRICS

COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4	COLUMN 5	COLUMN 6	COLUMN 7
Customer Metrics*	Major Opportunity	Disadvantage	Typical	Advantage	Best-in-class	Median
On Time Shipments	Less than 95%	≥ 95 and < 98%	≥ 98 and < 99%	≥ 99 and < 99.8%	≥ 99.8%	98.5%
Total Order Cycle Time	Greater than 96.7 Hours	≥ 51.5 and < 96.7	≥ 28.4 and < 51.5	≥ 24 and < 28.4	< 24 Hours	48 Hours
Internal Order Cycle Time	Greater than 48 Hours	≥ 24 and < 48	≥ 24 and < 24	≥ 8.2 and < 24	< 8.2 Hours	24 Hours
Perfect Order Completion Index	Less than 83%	≥ 83 and < 90.2%	≥ 90.2 and < 95.6%	≥ 95.6 and < 99%	≥ 99%	93.1%
Lost Sales (Percent of SKUs Stocked Out)	Greater than 5.6%	≥ 2 and < 5.6%	≥ 0.5 and < 2%	≥ 0.01 and < 0.5%	< 0.01%	1.4%
Backorders as a Percent of Total Orders	Greater than 5.4%	≥ 2 and < 5.4%	≥ 1 and < 2%	≥ 0.2 and < 1%	< 0.2%	1.5%
Backorders as a Percent of Total Lines	Greater than 7.6%	≥ 2.1 and < 7.6%	≥ 1 and < 2.1%	≥ 0.2 and < 1%	< 0.2%	1.4%
Backorders as a Percent of Total Dollars/Units	Greater than 5.6%	≥ 3 and < 5.6%	≥ 1 and < 3	≥ 0.5 and < 1	< 0.5%	2%
Operations Metrics	Major Opportunity	Disadvantage	Typical	Advantage	Best-in-class	Median
INBOUND METRICS						
Dock-to-Stock Cycle Time, in Hours	Greater than 24 Hours	≥ 15.6 and < 24	≥ 6.5 and < 15.6	≥ 2.3 and < 6.5	< 2.3 Hours	9.1 Hours
Suppliers Orders Received per Hour	Less than 0.9 Per Hour	≥ 0.9 and < 2	≥ 2 and < 3.8	≥ 3.8 and < 10.26	≥ 10.26 Per Hour	3 Per Hour
Lines Received and Put Away per Hour	Less than 8.2 Lines Per Hour	≥ 8.2 and < 15	≥ 15 and < 20.7	≥ 20.7 and < 48.528	≥ 48.528 Lines Per Hour	18.5 Lines Per Hour
Percent of Supplier Orders Received with Correct Documents	Less than 90%	≥ 90 and < 95.5%	≥ 95.5 and < 98%	≥ 98 and < 99.7%	≥ 99.7%	97
Percent of Supplier Orders Received Damage Free	Less than 95%	≥ 95 and < 98%	≥ 98 and < 99%	≥ 99 and < 99.1%	≥ 99.1%	98.5
On-time Receipts from Supplier	Less than 84.6%	≥ 84.6 and < 92%	≥ 92 and < 97%	≥ 97 and < 99%	≥ 99%	95%
OUTBOUND METRICS						
Fill Rate – Line	Less than 94.5%	≥ 94.5 and < 97.9%	≥ 97.9 and < 98.8%	≥ 98.8 and < 99.8%	≥ 99.8%	98%
Order Fill Rate	Less than 94.4%	≥ 94.4 and < 98%	≥ 98 and < 99%	≥ 99 and < 99.83%	≥ 99.83%	98.7%
Lines Picked and Shipped per Hour	Less than 15 Lines Per Hour	≥ 15 and < 30.5	≥ 30.5 and < 45.3	≥ 45.3 and < 71	≥ 71 Lines Per Hour	36 Per Hour
Orders Picked and Shipped per Hour	Less than 3 Orders Per Hour	≥ 3 and < 6	≥ 6 and < 11.4	≥ 11.4 and < 23.5	≥ 23.5 Orders Per Hour	8.5 Per Hour
Cases Picked and Shipped per Hour	Less than 40.4 Cases Per Hour	≥ 40.4 and < 110	≥ 110 and < 168	≥ 168 and < 281.4	≥ 281.4 Cases Per Hour	142.5 Per Hour
Pallets Picked and Shipped per Hour	Less than 4 Pallets Per Hour	≥ 4 and < 12	≥ 12 and < 18	≥ 18 and < 22	≥ 22 Pallets Per Hour	15 Per Hour
On Time Ready to Ship	Less than 96.5%	≥ 96.5 and < 98%	≥ 98 and < 99%	≥ 99 and < 99.9%	≥ 99.9%	98.6%
Financial Metrics	Major Opportunity	Disadvantage	Typical	Advantage	Best-in-class	Median
Distribution Costs as a Percent of Sales	Greater than 8%	≥ 5.4 and < 8%	≥ 4.2 and < 5.4	≥ 2.4 and < 4.2	< 2.4	5%
Distribution Costs as a Percentage of COGS	Greater than 10.1%	≥ 6.8 and < 10.1%	≥ 4.8 and < 6.8	≥ 2.3 and < 4.8	< 2.3	5.1%
Distribution Costs per Unit Shipped	Greater than \$16.4	≥ \$3.7 and < \$16.4	≥ \$0.7 and < \$3.7	≥ \$0.2 and < \$0.7	< \$0.2	\$1.1
Days on Hand Raw Materials	Greater than 67.2 Days	≥ 45 and < 67.2	≥ 30 and < 45	≥ 14 and < 30	< 14 Days	39 Days
Days on Hand Finished Goods Inventory	Greater than 70.6 Days	≥ 38.4 and < 70.6	≥ 30 and < 38.4	≥ 15.8 and < 30	< 15.8 Days	32 Days
Inventory Shrinkage as a Percent of Total Inventory	Greater than 1.5%	≥ 0.5 and < 1.5%	≥ 0.1 and < 0.5	≥ 0.01 and < 0.1	< 0.01%	0.20%
Capacity/Quality Metrics	Major Opportunity	Disadvantage	Typical	Advantage	Best-in-class	Median
Average Warehouse Capacity Used**	Less than 70.8%	≥ 70.8 and < 80%	≥ 80 and < 85%	≥ 85 and < 92%	≥ 92%	85%
Peak Warehouse Capacity Used**	Less than 85%	≥ 85 and < 95%	≥ 95 and < 98%	≥ 98 and < 100%	≥ 100%	97%
Honeycomb Percent	Less than 29.2%	≥ 29.2 and < 66.6%	≥ 66.6 and < 80%	≥ 80 and < 85%	≥ 85%	72%
Inventory Count Accuracy by Dollars/Units	Less than 97.8%	≥ 97.8 and < 99%	≥ 99 and < 99.5%	≥ 99.5 and < 99.9%	≥ 99.9%	99.20%
Inventory Count Accuracy by Location	Less than 92.4%	≥ 92.4 and < 97.4%	≥ 97.4 and < 99%	≥ 99 and < 99.8%	≥ 99.8%	98.50%
Order Picking Accuracy (Percent by Order)	Less than 98%	≥ 98 and < 99.1%	≥ 99.1 and < 99.7%	≥ 99.7 and < 99.9%	≥ 99.9%	99.50%
Material Handling Damage	Greater than 1	≥ 0.4 and < 1	≥ 0.09 and < 0.4	≥ 0.007 and < 0.09	< 0.007	0.20
Equipment/Forklifts Capacity Used	Less than 40%	≥ 40 and < 76.2%	≥ 76.2 and < 81.2%	≥ 81.2 and < 94%	≥ 94%	80%

*Note: Additional customer metrics can be found under Perfect Order Metrics Section.
 Legend: > greater than; ≥ greater than or equal to; < Less than

TABLE 7. QUINTILE PERFORMANCE CLASSIFICATIONS FOR METRICS, CONT.

COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4	COLUMN 5	COLUMN 6	COLUMN 7
Employee Metrics	Major Opportunity	Disadvantage	Typical	Advantage	Best-in-class	Median
Annual Workforce Turnover	Greater than 17%	>= 10 and < 17%	>= 4 and < 10%	>= 0.8 and < 4%	< 0.8	6.80%
Productive Hours to Total Hours	Less than 78%	>= 78 and < 85%	>= 85 and < 88%	>= 88 and < 92%	>= 92%	87%
Perfect Order Metrics	Major Opportunity	Disadvantage	Typical	Advantage	Best-in-class	Median
Percent of Orders with On-time Delivery	Less than 93.5%	>= 93.5 and < 96%	>= 96 and < 98%	>= 98 and < 99.4%	>= 99.4%	98%
Percent of Orders Shipped Complete	Less than 92%	>= 92 and < 96%	>= 96 and < 98.3%	>= 98.3 and < 99.5%	>= 99.5%	98%
Percent of Orders Shipped Damaged Free (Outbound)	Less than 96%	>= 96 and < 98.9%	>= 98.9 and < 99.3%	>= 99.3 and < 99.9%	>= 99.9%	99%
Percent of Orders Sent with Correct Documentation	Less than 98%	>= 98 and < 99%	>= 99 and < 99.8%	>= 99.8 and < 99.99%	>= 99.99%	99.5%
GMA/FMI Perfect Order Metrics	Major Opportunity	Disadvantage	Typical	Advantage	Best-in-class	Median
Percent of Cases Shipped vs. Cases Ordered	Less than 95%	>= 95 and < 98%	>= 98 and < 99.1%	>= 99.1 and < 99.9%	>= 99.9%	99%
Percent of On Time Delivery (Retail)	Less than 95%	>= 95 and < 98%	>= 98 and < 98.8%	>= 98.8 and < 99.6%	>= 99.6%	98%
Percent of Data Synchronized SKUs	Less than 91.8%	>= 91.8 and < 99.4%	>= 99.4 and < 100%	>= 100 and < 100%	>= 100%	100%
Percent of Unsaleables (Damaged Product)	Greater than 5%	>= 2 and < 5%	>= 0.5 and < 2	>= 0.06 and < 0.5	< 0.06%	0.80%
Day of Supply (Forward Coverage)	Greater than 79.8	>= 40.6 and < 79.8	>= 28.2 and < 40.6	>= 18.4 and < 28.2	< 18.4 Days	31.5 Days
Service at the Shelf	Less than 90%	>= 90 and < 97.3%	>= 97.3 and < 98.4%	>= 98.4 and < 99.4%	>= 99.4%	98%
Cash-to-Cash Metrics	Major Opportunity	Disadvantage	Typical	Advantage	Best-in-class	Median
Inventory Days of Supply	Greater than 95 Days	>= 60.5 and < 95	>= 35 and < 60.5	>= 19 and < 35	< 19 Days	41.2 Days
Average Days Payable	Greater than 60 Days	>= 43.2 and < 60	>= 33.2 and < 43.2	>= 24.6 and < 33.2	< 24.6 Days	38 Days
Average Days of Sales Outstanding	Greater than 60 Days	>= 48 and < 60	>= 38.6 and < 48	>= 29 and < 38.6	< 29 Days	45 Days

Which Metrics Really Matter?

Each year we identify the Top 10 most popular measures. We ask participants to indicate if a metric was not used so that we can determine the usage percent based on total responses for each metric. Table 8 shows the Top 10 most popular metrics used and how that has changed since the 2005 study.

On Time Shipments reclaimed the top spot for 2009. Nearly 86% of the respondents indicated using this metric to measure their operational performance.

Nine of the 10 metrics have been in the Top 10 at some point during the course of this study. This is the first time that Inventory Count Accuracy by Location has made the Top 10 list. In 2008, Inventory Count Accuracy was split into two metrics, "by Location" and "by Dollars/Unit." The reason for the change was to provide a clearer definition. Frequently, Inventory Count Accuracy was defined differently by various companies, leading to some confusion regarding what to report. The one metric that was in the Top 10 in 2009 but not this year is "Percentage of Supplier Orders Received with Correct Invoice."

In past years, Top 10 lists reported that the overall industry was attempting to take a balanced approach to managing their DCs and warehouses. However, this year tells us a different story. There is more focus on internal operations of the warehouse, perhaps at the expense of satisfying customers. This may be an anomaly. Almost 80% of survey respondents report that the customer is their number one focus. Yet, it is interesting that the

TABLE 8. TOP 10 MOST POPULAR MEASURES USED – 2010

Metric/Metric Category	% Using	2009 Rank	2005 Rank
1. On Time Shipments – Customer	85.8%	2	1
2. Order Picking Accuracy – Quality	73.2%	1	6
3. Average Warehouse Capacity Used – Capacity	70.4%	3	10
4. Annual Workforce Turnover – Employee	60.2%	5	7
5. On-time Ready to Ship – Outbound Operations	58.8%	7	–
6. Peak Warehouse Capacity Used – Capacity	58.7%	8	–
7. Fill Rate – Line – Outbound Operations	57.7%	6	–
8. Dock-to-stock Cycle Time, in Hours – Inbound Operations	56.2%	9	–
9. Inventory Count Accuracy by Location – Quality	53.0%	–	–
10. Order Fill Rate – Outbound Operations	50.7%	4	9

****Note:** Average and Peak Warehouse Capacity does not always reflect best practices. Due to the calculations for quintiles, we have continually reported that best in class is above 90%. A high average warehouse capacity is not beneficial; studies have shown that an average warehouse capacity between 80 and 85% allows the warehouse to respond to shifts in demand.

metrics being used do not focus on the customer. Certainly, in the short run, firms need to cut costs and become more efficient in order to survive. In the long term, reductions in customer loyalty or satisfaction will have a financial consequence.

Mind the Gap

Philosophers have argued that “truth” is relative. While we will leave that argument with the philosophers, it is easy to see that there truly are differences between a well-run DC and a badly run one. The Bad Warehouse Blog featured on *DC Velocity Magazine’s* website and WERC have been on a mission to educate companies on how bad some companies are when it comes to operating a warehouse. So, what is a bad warehouse?

Some of the true, but sad, real examples include using post-it notes to label products and sharpie markers to keep track of cycle counting are definitely not best practice. Neither is having an employee hop on a bike and start knocking on trailers in the yard in search of an empty trailer. As you may imagine, there are consequences of not looking at your performance measures for several months and finding out that you now own over 123 years worth of inventory of a particular item.

Perhaps you operate a great DC. You have a benchmarking plan in place. Not only do you participate in benchmarking

surveys, your warehouse helps develop process benchmarking best practices. You understand your desired outcomes and continuously strive for best-in-class performance for your key metrics.

But how big is the gap between a good DC and a bad one? To make this comparison we looked at the gap between major opportunity and best-in-class performers for all 50 metrics. Then, we calculated the difference, or the gap, between good and bad warehouses to calculate the percent change. Finally, we compared 2010 results with 2009. [Tables 9-10](#) are a detailed look at the metrics for 2010 and the performance gap.

What we found is quite interesting. First, there was little difference from 2009 to 2010. Those measures that had the biggest gaps in 2009 were almost the same in 2010. The only exceptions are Annual Workforce Turnover and Dock-to-stock Cycle Time, which are new to 2010. Orders Picked and Shipped Per Person Hour and Internal Order Cycle Time closed their gaps enough to drop off the list.

Seven of the metrics with the largest gaps also saw across-the-board improvements in performance*. However, the gap between bad warehouses and good warehouses remains large. This reinforces the notion that good warehouses have their processes figured out.

TABLE 9. GOOD VS. BAD WAREHOUSES 2010

Metrics	Major Opportunity	Best In Class	Difference in Performance	Performance Gap
Lost Sales (Percent of SKUs Stocked Out)*	Greater Than 5.6%	< 0.01%	-5.59	99.8%
Inventory Shrinkage as a Percent of Total Inventory*	Greater Than 1.5%	< 0.01%	-1.49	99.3%
Material Handling Damage*	Greater Than 1	< 0.007	-0.993	99.3%
% of Unsaleables (Damaged Product)	Greater Than 0.5%	< 0.06%	-4.94	98.8%
Backorders as a Percent of Total Lines*	Greater Than 7.6%	< 0.18%	-7.42	97.6%
Backorders as a Percent of Total Orders*	Greater Than 5.44%	< 0.2%	-5.24	96.3%
Annual Work Force Turnover*	Greater Than 17%	< 0.8%	-16.2	95.3%
Backorders as a Percent of Total Dollars/Units*	Greater Than 5.6%	< 0.5%	-5.1	91.1%
Suppliers Orders Received Hour	Less Than 0.92 Per Hour	> 10.26 Per Hour	9.34	91.0%
Dock-to-stock Cycle Time, in Hours	Greater Than 24 Hours	< 2.3 Hours	-21.7	90.4%

TABLE 10. LARGEST GAPS 2010 VS. 2009

2010	2009
Lost sales (Percent of SKUs Stocked Out)	Lost sales (Percent of SKUs Stocked Out)
Inventory Shrinkage as a Percent of Total Inventory	% of Unsaleables (Damaged Product)
Material Handling Damage	Inventory Shrinkage as a Percent of Total Inventory
% of Unsaleables (Damaged Product)	Material Handling Damage
Backorders as a Percent of Total Lines	Suppliers Orders Received per Hour
Backorders as a Percent of Total Orders	Internal Order Cycle Time
Annual Work Force Turnover	Orders Picked and Shipped Per Person Hour
Backorders as a Percent of Total Dollars/Units	Backorders as a Percent of Total Orders
Suppliers Orders Received Hour	Backorders as a Percent of Total Dollars/Units
Dock-to-stock Cycle Time, in Hours	Backorders as a Percent of Total Lines

TABLE 11. MATERIAL HANDLING AND PUTAWAY – PROCESS BENCHMARKS

Process Group	Poor Practice	Best Practice
Material Handling	<ul style="list-style-type: none"> Primarily manual handling with little or no process definition and poor ergonomics 	<ul style="list-style-type: none"> Flexible and efficient material handling processes with appropriate automation tailor made for current and forecast business needs
Housekeeping & Safety	<ul style="list-style-type: none"> Poor housekeeping, waste materials in access ways and product not organized No safety training Poor safety record (or no safety record kept) Obvious safety hazards High levels of product and property damage No program to resolve damage issues 	<ul style="list-style-type: none"> Excellent Housekeeping work areas are clear of debris, goods are neatly stacked, no excess moisture, dirt, etc. evident Formal, on-going safety program with records posted in workplace Excellent safety record Insignificant product damage ISO type quality and corrective action program
Putaway	<ul style="list-style-type: none"> No defined putaway process No initial record keeping to identify materials to be put away No defined staging area for product to be put away 	<ul style="list-style-type: none"> System dynamically selects putaway locations, based on cube, weight, product velocity and minimizing travel time In truck RF transactions in real time Clearly defined staging areas—support putaway by zone and travel time
Metrics	<ul style="list-style-type: none"> No performance metrics 	<ul style="list-style-type: none"> Performance metrics support customer requirements and are tracked, posted and reported and used for continuous improvement
Product Identification	<ul style="list-style-type: none"> Product is not marked or labeled No consideration of or provision for automated capture of bar coded product data No consideration of or provision for automated capture of RFID data 	<ul style="list-style-type: none"> Product is properly marked for identification using a industry standard label format Product labeling supports the use of automated sorting and diverting equipment and AR/AS equipment integrated with WMS RFID enabled product identification tags, integrated into WMS system location map

Source: WERC *Warehousing & Fulfillment Process Benchmark & Best Practices Guide, 2010 Edition*

Another interesting point is that these metrics represent the best of bad warehouses (Major Opportunity firms) and the worst level of performance for good warehouses (best-in-class firms). For example, those respondents in the Major Opportunity category for lost sales as percent of sales was 5.6% and higher. While some respondents were at 5.6%, the majority in this group was much worse! For the group best-in-class firms, the worst possible number for this metric was .01%. In other words, many firms were operating below .01% on this metric. This highlights the potential for even larger gaps in performance between good and bad warehouses.

The Processes

How you manage your DC or warehouse is important. We believe operational excellence hinges on your understanding of how your DC or warehouse operates. And the best way to understand how well you are doing is to benchmark not just your performance, but your processes as well.

In the next pages, we will try to link the performance of some metrics back to the processes within your warehouse. There are no hard and fast rules on how to do this, but we suggest comparing your current practice to the best practices. A great resource is the Warehousing Education and Research Council's *Warehousing & Fulfillment Process Benchmark & Best Practices Guide*.

The *Guide* outlines eight topic areas to help practitioners understand warehouse performance and to gain a concrete understanding of best practices for key processes. The topics are: Receiving & Inspection, Material Handling & Putaway, Slotting, Storage & Inventory Control, Picking & Packing, Shipping & Load Consolidation, Shipment Documentation, and Warehouse Management System (WMS).

The topic area is then further defined by process groups. The guide provides explanations, definitions and practical examples of the processes. It then outlines benchmark attributes in five ranking columns: *poor, inadequate, common, good* and *best* practices. This is then followed by key performance metrics to better manage the performance and finally a case study illustrates best practices.

Material Handling Damage

How you handle the products you are storing in your DC or warehouse says a lot about how you handle your operations. Not only do poor handling techniques harm your performance for Material Handling Damage, it can affect other measures and processes as well.

Table 11 illustrates poor and best practice benchmarks for Material Handling Putaway. Best Practice represents what best-in-class firms are doing, while poor practice typically highlights what Major Opportunity firms are currently doing in their warehouses.

TABLE 12. PICK AND PACK – PROCESS BENCHMARKS

Process Group	Poor Practice	Best Practice
Strategy & Methods	<ul style="list-style-type: none"> No picking strategy No process to review pick methods 	<ul style="list-style-type: none"> Picking strategy supports current and forecasted customer requirements and will include multiple optimized pick/pack processes. Optimized wave picking and task interweaving. Review pick processes and strategy for each product at least once per quarter. Modeling and simulations are run frequently.
Tactics & Equipment	<ul style="list-style-type: none"> Pick/pack areas are not defined, issues meeting current volume No specialized material handling equipment, only manual movement Operator efficiency not monitored Pick areas are set up without any consideration of operator fatigue and injury Poor housekeeping, obvious debris and clutter 	<ul style="list-style-type: none"> Pick areas are optimized to support current and flexible enough to handle future demand Conveyors or other automated material handling equipment to bring the orders into each required pick zone, eliminating travel time for pickers (Pick to Light, AR/AS, flow rack, auto pick equipment, may be used) Operator pick efficiency and travel time are system managed and optimized All pick/pack areas laid out ergonomically to reduce employee fatigue and injury Excellent housekeeping
Pick Documents	<ul style="list-style-type: none"> Customer original order document is used for picking Pick jobs not managed, orders are picked as they arrive from customers 	<ul style="list-style-type: none"> Pick travel path minimization through order picking in travel path sequence using serpentine approach Batch picking of the same SKUs for multiple orders, or wave pick sequencing to plan picks per zone in advance
Transactions	<ul style="list-style-type: none"> Manual documents, centralized data entry Transaction processing inconsistent Systems do not support transaction process well RFID not understood nor considered 	<ul style="list-style-type: none"> RF terminals, wireless speech system or similar 2-way data transfer system enables automated order communication to personnel, portable printers used Transactions are in real time Single system of record, no data redundancies RFID tag/EPC tracking integration into pick process when required
Performance	<ul style="list-style-type: none"> Inconsistent record of activity by major task No measures of staff productivity Customers are not included in the performance review process 	<ul style="list-style-type: none"> Record of daily activity by major task and staffing levels displayed on warehouse floor. Employees are included in continuous improvement programs Productivity targets set and measured, showing an improving trend and/or meeting goals Customers can review performance activity level via online reporting

Source: WERC Warehousing & Fulfillment Process Benchmark & Best Practices Guide, 2010 Edition

Backorders as a Percent of Total Orders, Total Units or Total Dollars/Unit

Backorders in a DC can cause major problems by holding shipments up which can lead to reducing customer service levels. Backorders looks at those orders being held and shipped late due to lack of available inventory or stock. Poor performance in numbers for backorders will affect your Picking & Packing (Table 12) operations and Load Consolidation & Shipping (Table 13) operations. If backorders are a consistent problem for your warehouse, this can lead to poor performance in Lost Sales. Picking and packing is the process of locating and pulling product from inventory and packing it into shipment containers to fill a customer order. Load consolidation and shipping consist of the processes that support the transport of products and the infrastructure that supports delivery. During the shipping process products should flow seamlessly from the picking and cross docking processes. There should be a

balanced flow of orders into shipping. Your system should be capable of allowing order changes to priority or shipping method until late in the process. Only orders that have left the dock can be considered “shipped.”

Lost Sales (Percent of SKUs Stocked Out)

Lost sales occur when there is no stock available to fill a customer order. Instead of waiting for the product to be replenished, (i.e, it becomes a backorder), the customer may decide to use a different vendor to fill his order. That is the point when a lost sale occurs. It is an important indicator of risk and suggests that the DC or warehouse is having difficulty in managing their supply chains. Storage and Inventory Control activities relate to holding material and the processes of counting and transacting the material as it moves through the warehouse. Table 14 details benchmarks for poor and best practices. ■

TABLE 13. SHIPPING AND LOAD CONSOLIDATION – PROCESS BENCHMARKS

Process Group	Poor Practice	Best Practice
Shipping Process	<ul style="list-style-type: none"> • Products moving from the pick and pack area are not reliably processed for shipping • No system support for shipping • Shipments are processed as shipped at the end of the day or in large batches • No system in place for ASN generation and carrier manifesting • No order prioritization or workload balancing 	<ul style="list-style-type: none"> • Shipping processes and support system are seamlessly integrated with the pick and pack processes to eliminate additional processing • Shipments processed, as shipped, automatically, when truck leaves the dock • Shipping process integrated with real time customer ASN generation and carrier manifesting • Orders to be shipped are prioritized real time, and dynamically balanced between work zones to prevent over/under-utilization
Shipping Transactions	<ul style="list-style-type: none"> • Transaction processing is inconsistent • Original customer order is used as a shipping document • Transactions are batch processed, multiple standalone systems may be used 	<ul style="list-style-type: none"> • RF terminals, wireless speech system or similar enables automated shipping information distribution and processing • Transactions are in real time and on a single system of record
Managing Customer Requirements	<ul style="list-style-type: none"> • No attempt to support client requirements and routing guides • Inconsistent generation shipping documents • Retailer chargebacks are not addressed by warehouse personnel • RFID tags and Electronic Product Codes (EPC) are not considered nor understood 	<ul style="list-style-type: none"> • Customer shipping requirements (routing guides) drive shipping processes and documentation & information is maintained in an integrated system. All necessary parties have access to information • Integrated system generates customer specific shipping instructions and documents as part of normal shipping documents • Retailer chargebacks (non-compliance) are tracked and managed, corrective actions are generated to determine root cause • RFID tag/EPC tracking integrated into shipping process and promoted as a benefit

Source: WERC Warehousing & Fulfillment Process Benchmark & Best Practices Guide, 2010 Edition

TABLE 14. STORAGE AND INVENTORY CONTROL – PROCESS BENCHMARKS

Process Group	Poor Practice	Best Practice
Location Management & Review	<ul style="list-style-type: none"> • No management/control over product location and rotation • No serial number/lot number used • No understanding of cube fill • No review of storage locations for proper sizing & access 	<ul style="list-style-type: none"> • System design allows for automated process of product rotation using variable business rules to ensure proper lot control • Capability in system to track serial number and lots, integrated into warehouse and shipping processes • System manages cube fill automatically • Storage locations are reviewed automatically against current product data to ensure best access and proper sizing
Product Data & Special Requirements	<ul style="list-style-type: none"> • No product cube data available • No process to segregate products with special requirements • No segregation of items • No controlled access areas 	<ul style="list-style-type: none"> • System includes all product data characteristics including cube data • System driven process to segregate items with odor transfer, fire risk or requiring temperature control • Items are stored in special areas • High value items managed from receipt to storage. • Caged and controlled access for all high value and special items
Inventory Control System	<ul style="list-style-type: none"> • Periodic inventory counts to determine stock levels • Limited or no systems support for inventory control 	<ul style="list-style-type: none"> • System driven, rules based process for stock level verification • Single system of record with full integration between Order Management, ERP, WMS and TMS systems
Transaction Processing	<ul style="list-style-type: none"> • Paper transactions with no standard formats / content • Inconsistent transaction processing 	<ul style="list-style-type: none"> • Transactions captured at point of occurrence using bar codes or RFID tags • Transactions in real time
Cycle Count	<ul style="list-style-type: none"> • No cycle count program • No adjustment to on-hand counts 	<ul style="list-style-type: none"> • Continuous system generated cycle count program integrated into warehouse activities. Cycle count process is fully supported by wireless RF data collection • Cycle Count process records total count and location count accuracy in real time
Inventory Strategy	<ul style="list-style-type: none"> • JIT and Lean processes not used • Limited understanding of Vendor Managed Inventory concepts • No verifiable process for managing excess and obsolete 	<ul style="list-style-type: none"> • Culture, system and processes support JIT, Lean concepts • VMI and supplier stocking programs are widely used and are system supported • Aggressive programs to manage excess and obsolete inventory

Source: WERC Warehousing & Fulfillment Process Benchmark & Best Practices Guide, 2010 Edition

Metric Definitions

As pointed out in the study, there is often a lack of consensus—or sometimes, understanding—of what the metrics actually mean. Over the past years we have been told that companies have adopted these definitions and calculations across their organizations in an attempt to develop a consistent approach to reporting performance at each location. This has been one aspect of the study that is most rewarding. Use of an agreed-upon standard and definition will go a long way in assisting firms to understand and compare internal performance.

Definitions for the key operational metrics are provided here—grouped into categories to help you interpret the metrics in the report—as well as to provide a common understanding for benchmarking. ■

CUSTOMER METRICS	DEFINITION	CALCULATION
On-time Shipments	The percentage of orders shipped at the planned time. (Shipped means off the dock, and in transit to its final destination). NOTE: the time to ship may be defined by the customer, or it may be determined by the shipper in order to accommodate an On-time Delivery.	Number of order shipped on-time/ Total number of orders shipped
Total Order Cycle Time	The average end to end time between order placement by the customer and order receipt by the customer.	Excluding non-working days: sum of (Time order received by customer – time order placed)/Total number of orders shipped
Internal Order Cycle Time	The average internal time between when the order was received from the customer and order shipment by the supplier. NOTE: order shipment is defined as off of the dock, onto the shipping conveyance and ready for transit.	Excluding non-working days: Sum of (Time order shipment – time order received from the customer)/number of orders shipped.
Perfect Order Index	A compilation score which measures the result of each of the 4 major components of a Perfect Order: • Delivered On-time • Shipped Complete • Shipped Damage Free • Correct Documentation	The perfect order index (POI) is established by multiplying each component of the perfect order to one another. For example, if a company is experiencing a measure of 95% across all 4 metrics of the perfect order (on-time, complete, damage free and accurate documentation), the resulting perfect order index would be 81.4%
Lost Sales (Percentage SKUs Stocked Out)	An important risk indicator: what percent of sales were lost due to stock outs.	Dollar sales that were lost (i.e., they did not become backorders)/Total sales
Backorders as a Percentage of Total Orders and/or Backorders as a Percentage of Total Lines and/or Backorders as a Percentage of Total Dollars/Units	The portion of total orders that are held and shipped late due to lack of availability of stock. Can be measured by lines or by PO, by units or by dollar value.	Number of orders held and not shipped/ Total number of orders Number of order lines held and not shipped/ Total number of order lines Number of order dollars or units held and not shipped/ Total number of order dollars or units
OPERATIONS METRICS	DEFINITION	CALCULATION
INBOUND METRICS		
Dock-to-stock Cycle Time, in Hours	The dock-to-stock cycle time Equals the time (typically measured in hours) required to put away goods. The cycle time begins when goods arrive from the supplier and ends when those goods are put away in the warehouse and recorded into the inventory management system.	For a given time period: Sum of the cycle time in hours for all supplier receipts/Total number of supplier receipts
Supplier Orders Received Per Hour	Measures the productivity of receiving operations in supplier orders processed per person hour.	Total supplier orders processed in receiving/Total person hours worked in the receiving operation
Lines Received and Put-away Per Hour	Measures the productivity of receiving operations in lines processed and put-away per person hour.	Total lines received and put-away/Total person hours worked in the receiving operation
Percent of Supplier Orders Received With Correct Documents	The number of orders that are processed with complete and correct documentation as a percentage of total orders. Documentation includes packing slips, case and pallet labeling, certifications, ASN, carrier documents or other documents as required by the Purchase Order.	The number of supplier orders that are processed with complete and correct documents/ The total supplier orders processed in the measurement period

Percent of Supplier Orders Received Damage Free	The number of orders that are processed damage free as a percentage of total orders.	The number of supplier orders that are processed damage free/Total supplier orders processed in the measurement period
On-time Receipts From Supplier	Percent of orders received from a supplier on the date requested.	Number of supplier orders received on-time/ Total number of orders received
OUTBOUND METRICS		
Fill Rate – Line	Measures percent of orders filled according to customer request. NOTE: a single customer order line can request multiple shipments. In this case each shipment would be tracked as a separate request.	Percentage of orders lines filled to customer request/Total number of order lines filled
Order Fill Rate	Measures percent of orders filled according to customer request. NOTE: a single customer order can request multiple shipments. In this case each shipment would be tracked as a separate request.	Number of orders filled to customer request/ Total number of orders filled
Lines Picked and Shipped Per Person Hour and/or Orders Picked and Shipped Per Person Hour and/or Cases Picked and Shipped Per Person Hour and/or Pallets Picked and Shipped Per Person Hour	Measures the productivity of picking and shipping operations in lines per person hour. Measures the productivity of picking and shipping operations in orders per person hour. Measures the productivity of picking and shipping operations in cases per person hour. Measures the productivity of picking and shipping operations in pallets per person hour.	For a given time period: Total order lines picked and shipped/Total hours worked in the picking and shipping operation Total orders picked/Total hours worked in the picking and shipping operation Number of cases picked and shipped/Total hours worked in the picking and shipping operation Number of pallets picked and shipped/Total hours worked in the picking and shipping operation
On-time Ready to Ship	The percentage of orders ready at the planned time to meet customer requirements. NOTE: "ready for shipment" typically means that packaging and shipping documents are completed and ready for pickup.	Number of orders ready for shipment on time/Number of total orders shipped
FINANCIAL METRICS	DEFINITION	CALCULATION
Distribution Cost as a Percent of Sales	The cost to run distribution relative to total sales. Activities included in the operate warehousing process are: management activities, track inventory deployment, receive, inspect, and store inbound deliveries, track product availability, pick, pack, and ship product for delivery, track inventory accuracy, track third-party logistics storage and shipping performance.	Total distribution costs/Total sales
Distribution Costs as a Percent of COGS	The cost to run distribution relative to COGS. Activities included as part of total distribution operating costs are: management activities, track inventory deployment, receive, inspect and store inbound deliveries, track product availability, pick, pack, and ship product for delivery, track inventory accuracy, track third-party logistics storage and, shipping performance.	Total distribution costs/Total COGS (based on corporate income statement)
Distribution Cost Per Unit Shipped	The cost to run distribution relative to the units shipped through distribution. Distribution costs include: management activities; track inventory deployment; receive, inspect, and store inbound deliveries; track product availability; pick, pack, and ship product for delivery; track inventory accuracy; track third-party logistics storage; and shipping performance.	Total distribution costs/Total units shipped
Inventory Shrinkage as a Percent of Total Inventory	The amount of breakage, pilferage, and deterioration of all inventories relative to total inventory. Usually stated in terms of value; not units.	Sum (value of breakage, pilferage, deterioration to all inventory)/Total value of all inventory
Days on Hand – Raw Materials	The number of productive days before raw material supply is consumed.	Gross raw material inventory value/Average daily value of RM usage
Days on Hand – Finished Goods Inventory	Average sales days of finished goods inventory on hand in plants and warehouses.	Average FG Inventory Value (\$)/Average Daily Sales \$ per month

CAPACITY & QUALITY METRICS	DEFINITION	CALCULATION
Average Warehouse Capacity Used	The average amount of warehouse capacity used over a specific amount of time (month to month or yearly).	Average capacity used/Average capacity available
Peak Warehouse Capacity Used	The amount of warehouse capacity used during designated peak seasons.	Peak capacity used/Capacity available
Honeycomb Percentage	Measures how well actual cube utilization within the warehouse is managed. Especially important where slots may be only partially full. An example would be if 1 unit is in a location, and it has room for 10, the utilization for that slot/bin location is 10%.	Actual cube utilization/Total warehouse cube positions available
Inventory Count Accuracy (by Units/Dollars) and/or Inventory Count Accuracy (Percent by Location)	Measures the accuracy (by location and units) of the physical inventory compared to the reported inventory: If the warehouse management system indicates that 10 units of part number XYZ are in slot B0029, the inventory count accuracy indicates how frequently one can go to that location and find that the physical count matches the system's.	1 – (the sum of the absolute variance in units or dollars/The sum of the total inventory in units or dollars) 1 – (the sum of the number of locations containing an error/The total number of locations counted)
Order Picking Accuracy	This measures the accuracy of the orders picking process where errors may be caught prior to shipment such as during packaging.	Orders picked correctly/Total orders picked
Material Handling Damage	Measures the value of material damaged from Handling/Storage as a Percentage of COGS.	The value of material damaged from handling/storage/COGS
Equipment/Forklift Capacity Used	The amount of up time logged for equipment/forklifts.	Total amount of time equipment is used/Total amount of planned available time for use
EMPLOYEE METRICS	DEFINITION	CALCULATION
Annual Workforce Turnover	The rate at which permanent employees are replaced (excludes casual or seasonal labor).	Number of NEW employees at the beginning of the period/total number of employees at the beginning of the previous period
Productive Hours to Total Hours	Measures employee productivity against total hours (includes all hours – indirect and direct).	Hours charged to specific activities, tasks or projects/Total hours worked
PERFECT ORDER METRIC	DEFINITION	CALCULATION
Percent of Orders with On-time Delivery	The percentage of orders that arrive at their final destination at the agreed upon-time. NOTE: there are many definitions of "On-Time", and that the "time" may be a specific hour or day, or a window of time. "Agreed Upon" means that the customer and shipper have agreed to the delivery time as a general commitment or as a part of the purchase order or contract.	Number of orders delivered on-time/ Total number of orders shipped
Shipped Complete Per Customer Order	Measures the percentage of orders which shipped completely, meaning that all line/units ship with the order per agreement between the customer and shipper.	Number of orders shipped with all lines & units/ Total number of orders shipped
Shipped Damage Free (outbound)	This measures the percentage of customer orders shipped in good and usable condition. NOTE: orders damaged in transit are not considered here.	Number of orders shipped damage free/ Number total orders shipped
Correct Documentation (ASN, Invoice, etc.)	The percent of total orders for which the customers received an accurate invoice and other required documents including ASNs, etc.	Number of orders with correct documentation/ Number of total orders

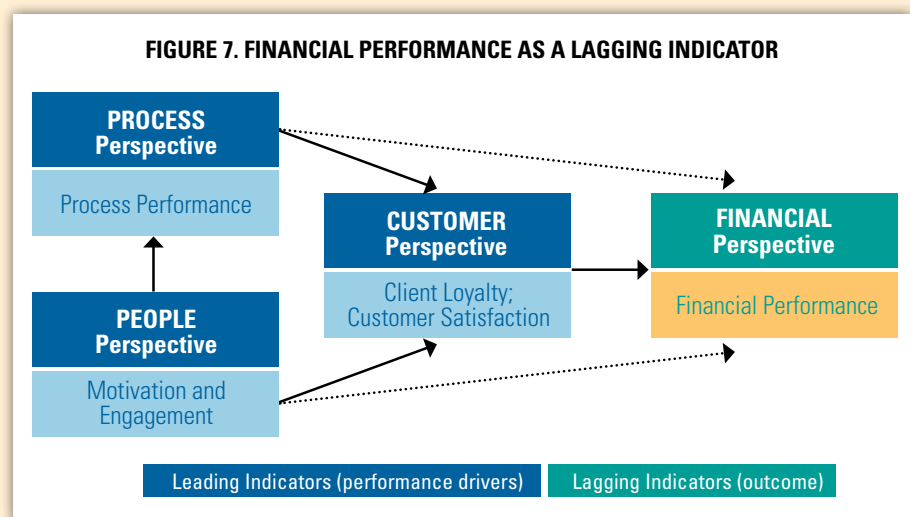
GMA/FMI POI METRIC	DEFINITION	CALCULATION
Percent of Cases Shipped vs. Cases Ordered	This measure is a ratio of the cases shipped to the cases ordered by your customers. The order should reflect the customer's last version of the order based on the customer's scheduled ship date.	Total cases shipped in a defined period/ Total cases ordered for shipment in the same period
Percent of On-time Delivery (Retail)	Measure of shipments received on-time by your customer. On-time is defined as one hour early but not late (anytime after the appointment time is considered late, unless the appointment time is changed by the customer.	Number of orders on-time/Total number of orders
Percent of Data Synchronized SKUs	This is a measure of the percentage of items that have SKU data fully synchronized between buyer and seller.	Number of fully synchronized SKUs/ Total SKUs
Percentage of Unsaleables (Damaged Product)	This is a measure of product that is received by the customer in unsaleable condition. Damage may be caused by manufacturing damage, carrier damage, customer warehouse damage, storage and store damage. It is recommended that manufacturers track the type of damage.	Total unsaleable dollars or units/ Total sales dollars or units
Days of Supply (Forward Coverage)	This is a measure of the number of days supply available at your customer's warehouse and store. This does NOT include your finished goods inventory. The metric is focused on identifying non-optimum levels of inventory in the supply chain. The metric can be expressed in dollars of inventory, or number of units.	Total inventory (dollars or units)/ (Total demand (dollars or units)/365)
Service at the Shelf	Defined as the fill rate at the store shelf level. What we were trying to measure was true cuts vs. true sales in a fashion similar to cases shipped vs. ordered.	Total units sold/Total unit demand
CASH-TO-CASH METRICS	DEFINITION	CALCULATION
Inventory Days of Supply	Measure of quantity of inventory-on-hand, in relation to number of days for usage which will be covered. Total gross value of inventory at standard cost before reserves for excess and obsolescence. Only includes inventory on company books, future liabilities should not be included.	Current (or period ending) total inventory value/ (Total Annual COGS/365)
Average Days Payable	Measure of the length of time required to pay suppliers; key element in cash-to-cash cycle time.	Average daily payables/(Total Annual COGS/365)
Average Days Sales Outstanding	The amount of time required to convert receivables to cash. To even out seasonality, this includes a rolling monthly average of AR (This is also known as "Average Collection Period").	Average daily Receivables/Total Annual Sales/365)

< pg. 1, "Continuing Improvement"

Third, best-in-class firms are doing a better job than the median on managing both increases and decreases in metrics. When compared to 2009, best-in-class firms either maintained their level of performance or improved their level of performance faster than median firms in 28 out of 50 metrics. Examples include Backorders as a % of Total Orders, Perfect Order Index, Cases Picked and Shipped Per Person Hour, and Material Handling Damage. This continues to lead us to believe that best-in-class firms better understand the processes behind how they achieve a certain level of performance.

What Does the Future Hold?

Overall, we believe that the best-in-class facilities will continue to lead the way to continued performance. This march to excellence will not be inexpensive, painless nor without effort. Most of the low hanging opportunities have been identified and corrected. Many of the bad warehouses will simply cease to exist and be outsourced to keep firms competitive. Firms no longer have the luxury of having an expensive supply chain in a down economy. And, if there are bad outsource providers out there, they will likely be pushed into extinction if they do not improve their processes and outcomes. The last push towards excellence will not only benefit his or her firm, but will increase everyone's understanding of what is possible. ■





An Association of Distribution Professionals

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