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Agile Logistics: Transforming the Distribution Center

May 2008

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Executive Summary

The pressure to effectively support fluctuating supply and demand without increasing staff or warehouse space is driving supply chain professionals to make the warehouse an agile and flexible part of their supply chain that can respond quickly to business changes. Improved logistics agility provides a company with a leg up on the competition in at least two major ways: by making full use of the resources on an order-by-order basis, and by intelligently positioning and configuring those resources in the short-term to better meet impending demand. As a result of these dynamics, a lofty 97% of the 150 companies surveyed in May 2008 revealed that they plan to improve warehouse operations in the next 24 months, with 56% of Best-in-Class companies planning to improve warehouse operation over the next 12 months. This report will examine how supply chain organizations are aligning their warehouse operations with business objectives by improving core processes, implementing or upgrading warehouse management software and mobile technologies, and extending their technology footprints to lower labor costs and improve performance through increased agility.

Research Benchmark

Aberdeen's Research Benchmarks provide an in-depth and comprehensive look into process, procedure, methodologies, and technologies with best practice identification and actionable recommendations

Best-in-Class Performance

Aberdeen used the following four key performance criteria to distinguish a Best-in-Class warehouse:

- **% of orders which are picked accurately (pick accuracy)** Best-in-Class companies pick 99% of orders accurately reducing errors and avoiding additional labor costs
- **% of orders which ship from the warehouse on-time and complete to customer request (ship accuracy)** Best-in-Class companies ship 99% of orders complete and on-time improving customer satisfaction and reducing transportation costs for split shipments
- **Decrease in warehouse labor costs relative to sales** Best-in-Class companies experience an average 1% decrease in labor costs
- **Decrease in demurrage / detention costs relative to sales** Best-in-Class companies experience a 1% decrease in demurrage / detention costs

"MMS's warehouse relies on Business Intelligence. We can mine into transaction history residing on our WMS, which records every pick, every put - every move. We've configured productivity reports by department (receivers, order picking, etc.) and type of picking (order, cluster) and there are separate metrics for each one."

~ Jonathan Franklin,
Supply Chain Specialist,
MMS Medical Supply

Competitive Maturity Assessment

Survey results show that the firms enjoying Best-in-Class warehouse performance shared several common characteristics. Best-in-Class are:

- 1.5 and 1.8 times more likely than Average and Laggard companies, respectively, to utilize Ruggedized Mobile Computers
- 1.4 and 2.9 times more likely than Average and Laggard companies, respectively, to utilize direct order picking with mobile devices

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- 2.2 times more likely than Laggard companies to utilize a commercially developed Warehouse Management Software

Required Actions

In addition to the specific recommendations in Chapter Three of this report, to achieve Best-in-Class performance, companies must:

- **Increase Operational Efficiency with Central Process Control.** Of those companies considered best-in-class, 89% have established central direction of processes. With increased visibility and more collaborative process capabilities, fluctuations and disruptions can be minimized inside the DC helping to create more flexibility and agility.
- **Turn up the speed of your warehouse.** Now that you've extended your capabilities and implemented enabling technology, re-evaluate your warehouse processes and look for new opportunities to fine-tune your DC engine.
- **Expand the solution footprint.** Less than 20% of BIC respondents currently utilize labor management software capabilities, but over 30% are making it a focus in the next 24-months. In addition, yard management and dock scheduling, voice systems, and slotting optimization solutions compliment existing WMS technology while driving additional savings. By gaining real-time visibility to activities in the DC, managers can more effectively balance their workforce and create more cross-operational opportunities.

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Chapter One: Benchmarking the Best-in-Class

Business Context

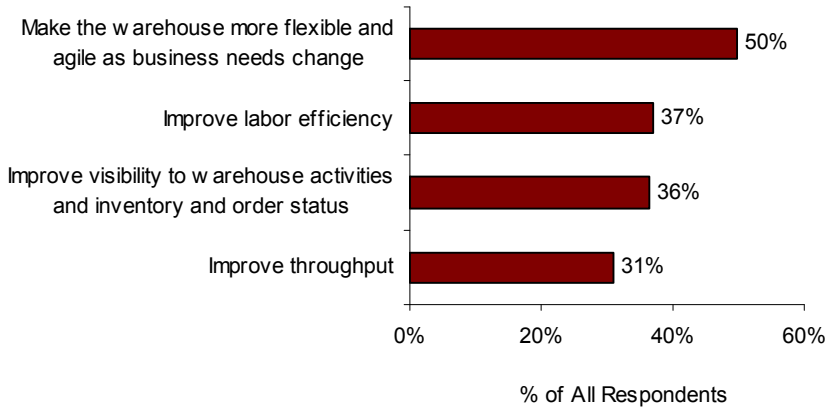
There has been a recent shift in the corporate view of the supply chain's role within an organization. At an accelerating rate, the supply chain is being viewed more as a vehicle to drive competitive advantage than simply as a cost center. As part of this shifting dynamic, Aberdeen's recent survey of warehouse and distribution center professionals shows that they plan to align their initiatives to business objectives in order to maximize the value that supply chain operations deliver to the organization.

Figure 1 shows the top 4 actions that logistics executives are considering as part of this alignment: chief among them, to make the warehouse more flexible and agile as business needs change (50%)

Fast Facts

- √ Best-in-Class achieve a 99% pick accuracy
- √ Best-in-Class achieve a 99% order accuracy
- √ Best-in-Class achieve an average 1% decrease in warehouse labor costs and detention / demurrage costs

Figure 1: Top 4 Actions Logistics Execs Are Taking to Improve Agility



Source: Aberdeen Group, May 2008

This alignment also requires a rethinking of existing warehouse processes and systems, as well as considering the automation of new areas of warehouse operations. In Figure 2 we see the top 6 strategies that these logistics executives plan to use as they implement the actions above. Clearly, the combination of processes, technology, and physical plant are all potential parts of a comprehensive set of transformations around warehouse agility.

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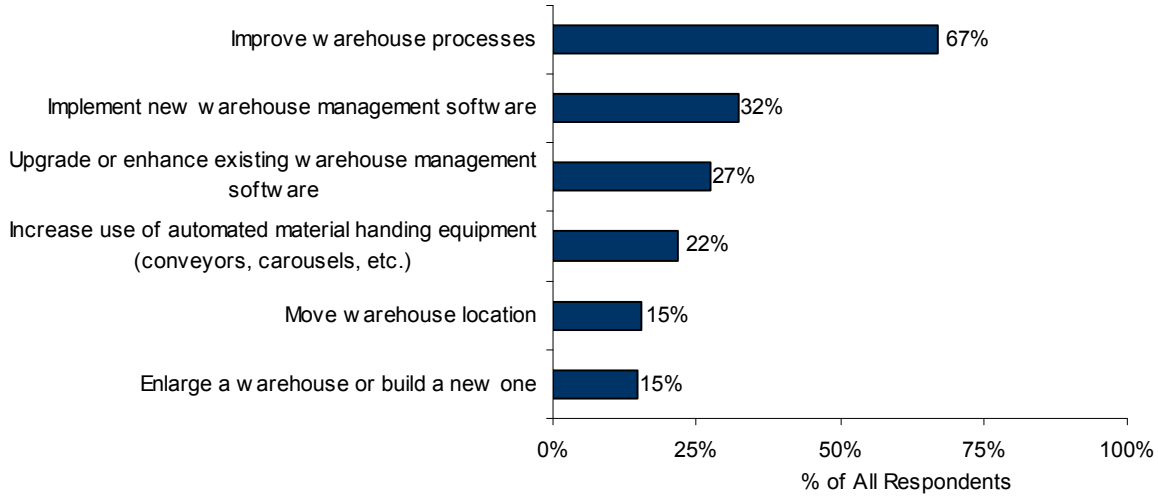
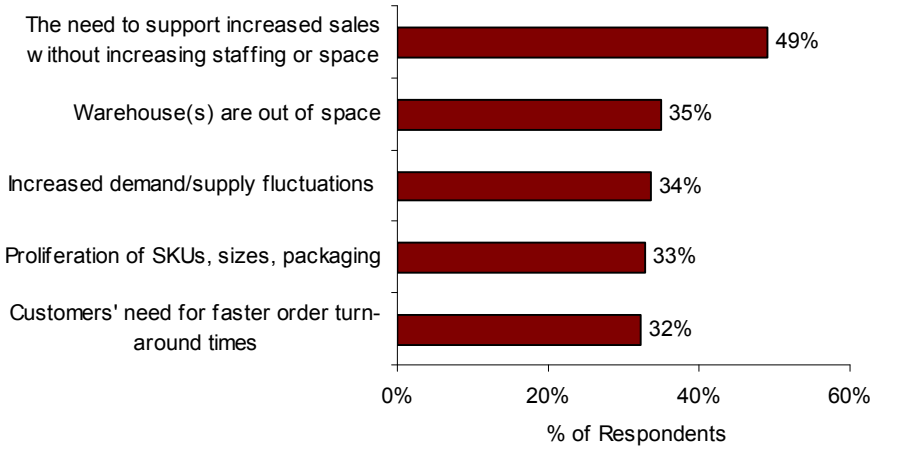
Figure 2: Top 6 Strategies Logistics Execs Plan to Use to Implement Actions



Source: Aberdeen Group, May 2008

What are the pressures driving these transformations? As Figure 3 illustrates, many factors combine to make warehouse change an imperative. Primary among them however is the need to support increasing sales without a corresponding increase in staffing or space (49%). Interestingly, this pressure saw an increase of 7 percentage points, compared to Aberdeen's 2007 warehouse survey. The remaining top 4 pressures driving warehouse change are all nearly equal in frequency: a lack of space (35%), supply and demand fluctuations (34%), the proliferation of SKU / sizes / packaging (33%) and customers' need to faster order turnaround times (32%).

Figure 3: Warehouse Pressures in 2008



Source: Aberdeen Group, May 2008

"We have been dealing with supply and demand fluctuations and being an apparel retailer we do suffer a proliferation of SKUs. We have special algorithms in our allocation model to allow substitutions of nearest fit, plus we tend to shy away from truly "fashion" items, meaning most of our goods are "in style" one year to the next. We see a robust WMS and automation as a competitive advantage."

~ Doug Hunter, Information Technology Director, Steve and Barry's

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With this in mind, the objective of this report is to provide a roadmap around process and technology for companies that want to chart the shortest course to an agile and flexible warehouse.

The Maturity Class Framework

Aberdeen used four key performance criteria to distinguish the Best-in-Class from Industry Average and Laggard organizations. The following table shows the absolute and relative performance in those metrics.

- **Orders Picked Accurately**. The % of orders that are picked correctly as to SKU and quantity the first time.
- **Orders Shipped On-time and Complete**. The % of orders that are shipped on or before the promised shipping date and shipped complete.
- **Change in warehouse labor costs**. The % change in warehouse labor costs year over year.
- **Change in Demurrage / Detention Costs**. The % change in demurrage / detention costs year over year.

Table 1: Top Performers Earn Best-in-Class Status

Definition of Maturity Class	Mean Class Performance
Best-in-Class: Top 20% of aggregate performance scorers	▪ 99% of orders picked accurately ▪ 99% of orders shipped on-time and complete ▪ An average 1% decrease in warehouse labor costs ▪ An average 1% decrease in demurrage / detention costs
Industry Average: Middle 50% of aggregate performance scorers	▪ 97% of orders picked accurately ▪ 95% of orders shipped on-time and complete ▪ An average of "no change" in warehouse labor costs ▪ An average 2% increase in demurrage / detention costs
Laggard: Bottom 30% of aggregate performance scorers	▪ 91% of orders picked accurately ▪ 89% of orders shipped on-time and complete ▪ An average 2% increase in warehouse labor costs ▪ An average 3% increase in demurrage / detention costs

Source: Aberdeen Group, May 2008

The Best-in-Class PACE Model

The ability to take an existing warehouse and mold it into an agile operation requires a combination of strategic actions, organizational capabilities, and enabling technologies. In order to provide a roadmap for underperforming organizations, this report examines some of the Best-in-Class warehouse capabilities and enablers.

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Table 2 summarizes the Pressures, Actions, Capabilities, and Enablers (PACE) as defined by Best-in-Class companies.

Table 2: The Best-in-Class PACE Framework

Pressures	Actions	Capabilities	Enablers
▪ The need to support increased sales without increasing staffing or space	▪ Make the warehouse more flexible and agile as business needs change ▪ Improve throughput ▪ Improve labor efficiency	▪ Practice cycle counting to maintain inventory control ▪ Ability to print customer-compliant labels for outbound product ▪ Advanced Replenishment and Pick Methodologies ▪ Reverse Logistics ▪ Direct warehouse operations with mobile devices ▪ Confirm transactions with automatic data capture (bar-coding, speech, RFID)	▪ Warehouse Management Software ▪ Direct Order Picking with Mobile Devices ▪ Ruggedized Mobile Computers ▪ Material Handling Equipment

Source: Aberdeen Group, May 2008

Best-in-Class Strategies

Not surprisingly, the strategies of Best-in-Class companies focus primarily on making the warehouse more agile and flexible. Earlier Aberdeen research has shown that Best-in-Class companies have invested in WMS technology in their largest facilities. As a result, they are now able to leverage that foundation to focus on process improvement and other technology improvements in the search for agility.

Overall, the top three actions Best-in-Class companies plan to take to address the need for growth without increasing staffing or space include the following:

- Make the warehouse more agile and flexible to accommodate changing business needs (55%)
- Improve throughput (35%)
- Improve labor efficiency (31%)

Key Paths to Improvement

Mobile Equipment

Business models are continuously evolving as a result of customer, competition, and product changes. However, one of the key Best-in-Class differentiators identified this research is the use of ruggedized mobile equipment. Figure 4 illustrates that Best-in-Class companies are 1.5 and almost 2 times as like to have mobile equipment compared to Average and Laggard companies.

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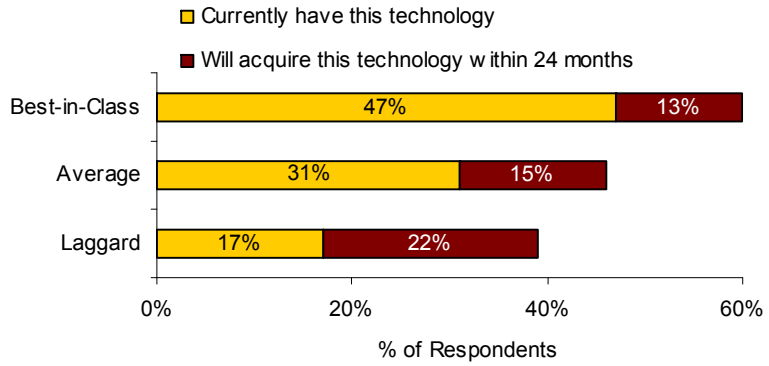
Figure 4: Ruggedized Mobile Equipment - The Path to Process and Data Improvement



Source: Aberdeen Group, May 2008

A common theme throughout this report, and a true enabler of the agile warehouse, is activity-based transaction execution and monitoring. Real-time data feeds via mobile devices have enabled Best-in-Class enterprises to separate themselves from the pack in many of the process and knowledge management tactics discussed in this report.

Best-in-Class companies find that once the data is visible in real-time the focus can then turn to optimizing processes. With the foundation of transaction data underneath them, **Event Management** and **Labor Management** software will be utilized in over 50% of Best-in-Class warehouses by 2009. By tracking warehouse inventory movements and synchronizing a more agile workforce with the addition of these solutions, on top of revamped processes and real-time data, even previously underperforming companies can position themselves for best-in-class expectations.

Yard Management and Dock Scheduling

Of the top 3 actions identified by companies in Aberdeen's research, Improved Throughput (35% of BIC) is most dependent upon effective management of resources at or outside the 4 walls of the warehouse: the dock and the yard. Yard management can be defined as the tracking of the location, age, and contents of trailers in the warehouse yard. The need for yard management varies greatly by operation; warehouses with a higher ratio of inbound trailers to available dock doors will have a much greater need for this technology. When poor management and scheduling create a bottleneck in the dock and yard, more man-power is required. Loose tracking of trailer aging can lead to detention and demurrage charges. Furthermore, poor yard management can reduce sales when inbound goods sit in the yard instead of filling customer orders. Companies seeking to optimize all warehouse operations will look to these edge processes, and integrate them with core systems and solutions.

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Aberdeen Insights — Strategy for the Retail Warehouse

The number two planned action among Laggards organizations is to improve visibility into activities, inventory, and order status. This action item is being driven by the concern for supply and demand fluctuations - Laggards are 1.3 and 2.8 times more likely to be concerned with supply and demand fluctuations compared to Average and Best-in-Class organization, respectively.

Upon closer inspection, almost 50% of Laggard companies are represented by industries that are known for demand forecasting difficulties, including Retail (14%), Consumer Electronics (14%), Automotive (10%) and Apparel (10%). These companies are also attempting to cope with the proliferation of SKUs, sizes, and packaging.

In speaking with a mid-size North American retailer, we discussed the slow technology adoption rates in the retail industry. "Retailers are very focused on product design and store level operations, perhaps not realizing a lot of cost reduction can come from warehouse operations automation," said this Director of Supply Chain Logistics of a mid-size retailer.

The trend among retailers, which was also noted in Aberdeen's recent report, Technology Strategies for Closed Loop Inventory Management, is unquestionably limiting their ability to reduce supply chain costs. Over-sized inventory buffers and obsolete inventory that often results in this highly cyclical industry are some of the unsavory results of limited visibility.

As previously noted, this report discusses many processes that require mobile devices. Organizations selling into retailer channels, however, need to go one step further and utilize Point-of-Sale (POS) data as it is available. Utilizing POS data improves multiple warehouse functions, such as replenishment strategies (see Chapter 2 and the discussion on Demand-based Replenishment).

In the next chapter, we elaborate on the Best-in-Class warehouse capabilities.

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Chapter Two: Benchmarking Requirements for Success

The integration of process with warehouse management software and mobile devices plays an important role in enabling the agile warehouse. The following case study illustrates how one company has combined these elements for superior performance and agility.

Case Study — Combining WMS with Mobile Data

Hub One Logistics is a redistribution company for the North American operations servicing many multi-national quick food service chains. The company operates five distribution centers, which up until 1.5 years ago were run on a homegrown warehouse management system.

The company was using mobile devices, which furnished real-time visibility into the movements, but they didn't have the ability to completely utilize the data.

They decided to upgrade to a commercially developed WMS in each of their DC's. They also implemented the Labor Standards module of the WMS. Jeff Bayer, Hub One's Supply Chain Vice President noted some of the key functionalities they achieved:

- A directed work mill with zero empty miles. The WMS knows where you are in the facility at all times. If a forklift picks a pallet it is notified of a nearby pallet that needs to be picked for shipment. They achieved this functionality within 2 weeks of the implementation.
- Task-based labor management. Working with a consultant the company established labor standards. Employees were engaged early on in the standards development process and went through an extended ramp up period in order to get acclimated to the targets. Thereafter staff members were given incentives to achieve maximum performance. Via integration with their WMS, the mobile devices now communicate how close to standard they are performing for each task.

The company reduced labor costs by 20% and pallet operators achieved zero empty miles for the first time.

Fast Facts

- √ Best-in-Class companies are 1.7 times more likely to utilize Warehouse Management Software compared to Laggard companies
- √ Best-in-Class companies are 1.6 times more likely to utilize a min / max replenishment methodology compared to Laggard companies

Competitive Assessment

Aberdeen Group analyzed the aggregated metrics of surveyed companies to determine whether their performance ranked as Best-in-Class, Industry Average, or Laggard. In addition to having common performance levels, each class also shared characteristics in five key categories: (1) **process** (the approaches they take to execute their daily operations); (2) **organization** (corporate focus and collaboration among stakeholders); (3) **knowledge**

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management (contextualizing data and exposing it to key stakeholders); (4) **technology** (the selection of appropriate tools and effective deployment of those tools); and (5) **performance management** (the ability of the organization to measure their results to improve their business). These characteristics (identified in Table 3) serve as a guideline for best practices, and correlate directly with Best-in-Class performance across the key metrics.

Table 3: The Competitive Framework

	Best-in-Class	Average	Laggards
Process	Ability to print customer-compliant labels for outbound product		
	66%	55%	27%
	Advanced Replenishment Methodologies		
	64%	51%	34%
	Reverse Logistics		
	59%	49%	15%
Organization	Central direction of processes in the warehouse		
	78%	67%	56%
Knowledge	Know the contents of every bin in the warehouse in real time		
	74%	63%	23%
	Confirm transactions with automatic data capture (bar-coding, speech, RFID)		
	72%	60%	42%
Technology	Warehouse technology currently in use:		
	▪ 52% Warehouse Management Software ▪ 66% Direct order picking with mobile-devices ▪ 47% Ruggedized Mobile Computers ▪ 47% Material Handling Equipment	▪ 48% Warehouse Management Software ▪ 47% Direct order picking with mobile-devices ▪ 31% Ruggedized Mobile Computers ▪ 40% Material Handling Equipment	▪ 30% Warehouse Management Software ▪ 17% Direct order picking with mobile-devices ▪ 17% Ruggedized Mobile Computers ▪ 29% Material Handling Equipment
Performance	Measure and post performance metrics to warehouse staff more than quarterly		
	81%	73%	66%

Source: Aberdeen Group, May 2008

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Capabilities and Enablers

As companies manage supply and demand fluctuations across their business and through their distribution centers, they not only look at the physical layout and technology used, but also at the services they provide. Competitive advantage can be found in delivering superior customer service, and also in delivering differentiating services and capabilities. So it came as no surprise that as we examined the capabilities and enablers used by Best-in-Class companies, we found a combination of services, processes, infrastructure and technology. The particular choices companies made depended upon their industry, size, and maturity, but in every case they focused on capabilities that provided the best ability to gain agility and cost savings within their unique environments.

Value-added Services

Aberdeen's many interviews during the course of this research showed that companies are not only managing more inventory in support of new products and customers, as well as changing the layout of their warehouses to accommodate new equipment, but they are also offering value-added services in a variety of areas.

"Our products are distributed through commercial, consumer, and distribution channels. The packaging side of our business has skyrocketed over the past few years, which has driven both our customer retention and revenue growth. "

~ Steve Marshner, Business Process Manager, Tessco

One of these, vendor-managed inventory (VMI) programs, has shown to be a growing area in a number of our Supply Chain surveys. While companies often benefit from the ability to see point-of-sale data and build their customers' inventories accordingly, there are often other aspects in a VMI relationship that require a warehouse to have true real-time synchronization along with industry-specific pick, pack, and printing capabilities.

What is interesting to note is that 75% of companies with the capability to print customer-compliant labels also saw an increase in the number of SKUs managed.

Advanced Replenishment Methodologies

Advanced replenishment strategies are most commonly utilized by distribution centers that are catering to retail markets, namely, Apparel, Consumer Packaged Goods, Food and Beverage, Consumer Electronics, and Retail. While manufacturing industries are also benefiting from advanced replenishment methodologies - it is the essence of Kanban in the lean enterprise - it is in industries where demand is known to fluctuate widely and is notoriously difficult to forecast that the following methodologies foster Best-in-Class performance.

Min / Max Replenishment

Of the companies that have advanced replenishment methodologies, 100% of Best-in-Class prescribe to the min / max inventory replenishment method, in which replenishment is automatically triggered when inventory hits a certain level. Similarly, if a product reaches an established maximum of inventory on-hand, the correct departments are notified to not purchase

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or stock additional inventory. This is the simplest and oldest of inventory management techniques, but serves well for items that have predictable volume and lead-time characteristics.

Demand-based Replenishment

Of the companies that have advanced replenishment methodologies, 75% of Best-in-Class companies, versus 68% of Average and 43% of Laggards companies, utilize demand-based replenishment. Demand-based techniques rely on near-real-time demand signals to trigger "pull" replenishment activities that ripple across the supply chain. Synchronization is important with this technique, since if product lead-times are too long, and demand fluctuates widely or too frequently, the system will not be able to respond effectively.

The ability to intelligently replenish stock boils down to visibility at multiple points across the supply chain combined with reasonably accurate demand forecasts. For example, retail replenishment is especially sensitive to accurate visibility. Demand information in a retail environment can come at day's end (or other cycle times) in a batch download, or through a near-real-time POS feed with scanning technology.

Regardless of approach, each of these replenishment methodologies requires a level of automated inventory management centered on the DC. Later in this report, technology and mobile equipment solutions are discussed, as well as their correlation with Best-in-Class performance.

Case Study — Working with POS Data

The warehouse operation of this North American mid-sized retailer receives Point-of-Sale data from store registers. The usefulness of this data extends not only to the warehouse shelves, but to the labor planning, and replenishment methodology.

The POS data is run through an algorithm that looks into recent weekly historical sales on a weighted average (the most recent weeks are weighted more heavily). In addition, the algorithm looks forward two weeks to determine the future demand (Annually, weights are applied to all 52 weeks of the year, to account for seasonality and special events). Depending how the year is trending to plan, a factor can be applied to the weekly weights in order to provide a better forecast for the replenishment model.

Each store has a threshold by location and by SKU. The algorithm is looking out two weeks, to see stock level in stores and recent historical sales in order to assess what they want to replenish at stores.

Continued

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Case Study — Working with POS Data

The DC takes the annual budget and the monthly revised Open-to-Buy (dollar amount budgeted for inventory purchases for a specific time period) forecasts and converts the dollars to unit forecasts (based on average unit retail). The unit forecasts are used to calculate the monthly labor requirement. The labor dollars are then manually adjusted by the different weeks in each month (to account for holidays or other spikes). "We then break down that labor into a cost per unit component for each transaction in the DC, so we can match our labor to our overall cost per unit budget. At a higher level, we evaluate the unit volume along with estimated inventory turns to determine overall DC storage capacity constraints," said this Director of Supply Chain Logistics of a mid-size retailer.

"The replenishment logic of weighted weeks and forward looking forecasting, coupled with variable trigger points for each SKUs/store relationship allows us load the stores with inventory in advance of the peaks and start bleeding down the inventory before the peak ends, so we have less returns to the DC and therefore less labor."

It is interesting to note that retailers with advanced replenishment capabilities are 100% more likely to use pick to light systems, and 60% more likely to use automated shipping sortation compared to companies not doing min / max or demand-based replenishment. In addition, more advanced automated materials handling equipment (MHE), like speech-based picking are slowly being adopted. Among those surveyed, 20% of retailers plan to adopt speech-based systems in the next 24 months.

The replenishment methods discussed above can increase the number of transactions in the warehouse, which could ultimately reduce the efficiency of a highly manual warehouse. However, advanced replenishment strategies offset this challenge through improving working capital utilization by reducing on-hand inventory. In addition, they can improve customer service by reducing the likelihood of stock-outs. As a result, Aberdeen's research shows that companies are actively engaged in improving their replenishment capabilities.

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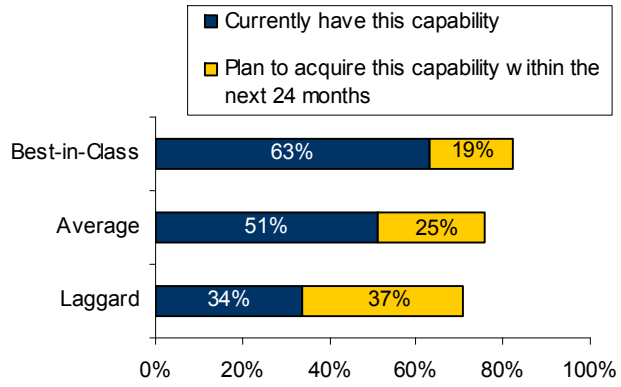
Figure 5: Plans for Advanced Replenishment Methods



Source: Aberdeen Group, May 2008

Reverse Logistics

Understanding that a key goal of an agile warehouse is to support increased sales, companies must also expect an increase in returns. Reverse logistics entails managing returns (sorting, testing, repairing, restocking, reshipping), crediting customers, and processing warranty claims. It can have a large impact on revenue and customer service levels.

A past Aberdeen report, Industry Best Practices in Reverse Logistics, examined the industry-specific challenges to reverse logistics excellence and found Return / Exchange Management to be a top challenge in 5 out of the 6 industries examined. The report identified a number of solutions to improving reverse logistics, including:

1. Restructure service organization with higher-level oversight and accountability,
2. Upgrade technology solutions to automate portions of the process,
3. Recover more costs from the supplier, and
4. Integrate the service organization more closely with other organizations (marketing, finance, and manufacturing).

This report builds upon our earlier research into reverse logistics by examining the first 2 elements of improving this process: organizational and technology capabilities. In the technology section, specifically, we will discuss the relationship between reverse logistics and a commercially developed Warehouse Management System.

"Rodale utilizes third-party logistics providers to manage its reverse logistics for selected geographical areas. A given provider will consolidate returns until a full trailer load is ready for delivery to our main DC. The process of utilizing third-party providers for reverse logistics allows Rodale to credit customers quickly and to save money on return postage delivery."

~ Ted Uhlman, Director of Distribution Services, Rodale, Inc.

Organization

Fifty-eight percent (58%) of Best-in-Class companies operating one DC have one person or department responsible for managing inventory. Similarly, (67%) of Best-in-Class companies with more than five DCs ensure each DC maintains a dedicated person or department responsible for managing inventory. Aberdeen has continuously correlated Best-in-Class status with central accountability; without it, it is difficult to remove the blinders that inhibit agility and flexibility.

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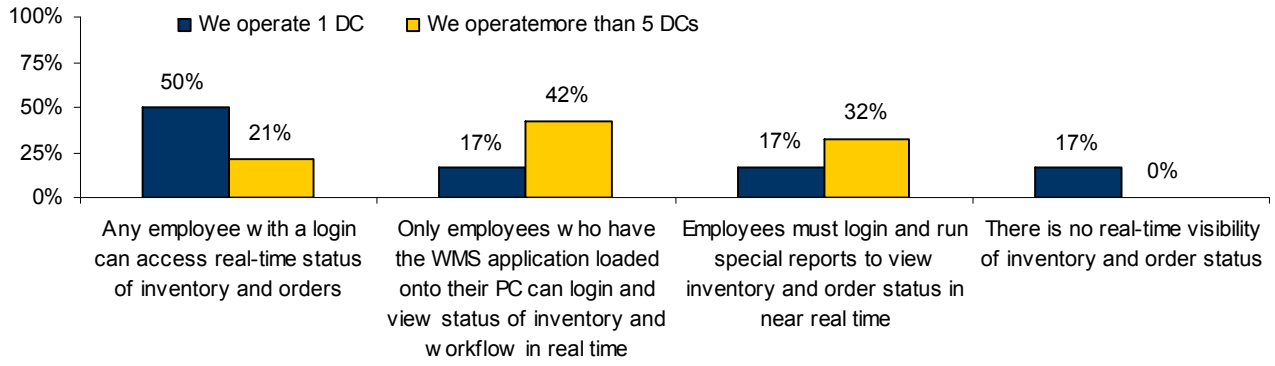
A key element of leveraging this central accountability is providing employee-level visibility. As the warehouse is a very task-based environment, centralized inventory management personnel can have difficulty in understanding real-time inventory movements that take place in facilities that may be well-removed from their physical location. As a result, Best-in-Class companies provide these employees access to real-time data captured on the warehouse floor (Figure 6).

Figure 6: Best-in-Class Employee Visibility into Inventory and Order Status



Source: Aberdeen Group, May 2008

Knowledge Management

In order to effectively manage the products within a warehouse, information must be gathered and communicated around stock levels, picking activities, put-away and slotting plans, item attributes, equipment status, and many other data elements. Each of these bits of information must be correlated with other related data and delivered to the appropriate user at the appropriate time and in the proper context, thus providing visibility.

Inventory accuracy, both in terms of quantity and location, is one of the key elements of warehouse information that must be continually updated with a high degree of confidence. Cycle counting is a proven best practice to ensure inventory accuracy, reduce obsolete inventory and identify inventory management process problems. Still, while 91% of Best-in-Class companies perform cycle counts on select SKUs as a validation of other inventory management techniques, only 56% of Laggards perform the task.

Figure 7 illustrates the key elements of real-time information visibility within the warehouse, and the relative adoption across our respondents.

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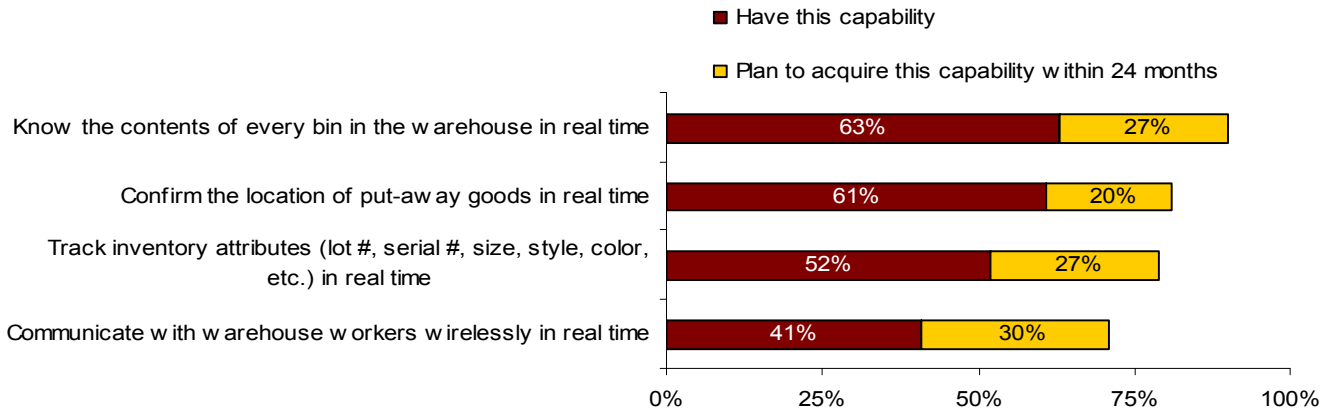
Figure 7: Real-time Visibility in a Retail-centric Warehouse



Aberdeen Group, May 2008

Technology

A key enabler of warehouse agility is timely, high quality data that is integrated with the core warehouse management system (WMS). While Aberdeen continues to see the use of spreadsheets, there is not a single Best-in-Class company among our respondents that maintains central direction in the warehouse by using this medium.

Our research shows that best-in-class companies consistently combine technology and process improvements as part of their underlying core competency. In fact, companies with either a commercially developed WMS or a homegrown / legacy WMS are 2.7 times more likely to maintain more flexible, centralized direction in the warehouse versus companies without a WMS (73% versus 27%).

Retail-centric Warehouse

Figure 7 includes the findings from Apparel, Consumer Electronics, Consumer Packaged Goods, Retail, and Wholesale.

Case Study — Integrating Software and Materials Handling Equipment

Steve and Barry's, a quickly growing retailer based in New York, owns and operates 200 stores in 33 U.S. states. The company's rate of growth was such that they went from 35,000 to 185,000 units. Both corporate and the supply chain organizations were focused on a long-term solution. "Our corporate culture considers the supply chain to be one of our best weapons and is prepared to make it as effective an operation as possible," said Doug Hunter, IT Director. They are now able to stock twice the amount of stores with the same labor.

Two years ago the company implemented a paper based picking system that used an automated conveyor for material movement and sortation for LTL shipments.

continued

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Case Study — Integrating Software and Materials Handling Equipment

The company was able to change their manual processes with the material handling equipment implementations and three software interfaces. The interaction is as follows:

- Logistics (load) optimization: The fist step in the process is to calculate store demand and determine what they need to ship for the next week out. By inputting parameters such as store location and cost per case, Steve and Barry's is able to generate waves. There are multiple stores loaded on each trailer and each section of a trailer constitutes a wave.
- Warehouse Management Systems: The waves generated during the optimization are loaded into the WMS after running thru a pick optimization routine (this is an integration between the in-house WMS and an ALS supplied optimization routine). Picking slips and packing labels are generated from the information feed. Additionally, the work is distributed by the picking method.
- Warehouse Control System: At the staging area, shipments are fed into the conveyor. The labels are read and the cases are appropriately sorted for shipping.

Ninety percent (90%) of the company's inventory goes through this system.

Material Handling

Another key way that warehouse executives are optimizing the warehouse it through the use of material handling equipment such as conveyor systems and automated storage and retrieval technology integrated with their WMS. These systems drive lower labor costs, faster pick and put-away rates, and improved accuracy.

Case Study — Integrating WMS and Material Handling at IKEA

According to Mark Guarino, Distribution Systems Manager, "We wanted to create more agility for our unique distribution needs and were looking for ways to utilize technology to help generate the savings we were hoping to obtain."

Because IKEA's distribution centers are modeled differently than your typical warehouse, the focus was creating a more flexible storage environment that could handle a large number of SKUs that can be defined as opportunistic and cyclical.

continued

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Case Study — Integrating WMS and Material Handling at IKEA

Because over 80% of their products move through the supply chain as full pallets, IKEA needed a way to get product in and out of the warehouse quickly. Whether product is coming in on, euro-pallets, or longer "IKEA" pallets, it's important to get the pallets in their respective locations quickly, efficiently, and in a high-density environment to save space. The IKEA Team went to work, cracked thru the technology barrier and put in place new technology, including:

- Moving from their homegrown WMS to a more flexible and feature-rich commercial WMS solution that provides them with future growth and expansion.
- Fully automated material handling equipment (automated storage and retrieval system) for receiving and inducting all pallets into the warehouse. Utilizing a fully automated system helps to decrease reliance on manual labor and increase productivity and flexibility in the warehouse. It also allows IKEA to build this portion of the DC much higher (18 levels of rack). This and the use of Double-Deep locations provide high density and make the most of the acreage purchased.
- Replacing their paper (piece pick) and labels (pallet picks) and deploying rugged mobile devices on their fork trucks to manage warehouse operations in real-time.

IKEA currently has portions of two of their 5 full-pallet DC's fully automated. Based on their significant savings so far, the economics lineup and the payback on their technology investments have paid off. Implementing technology is never an easy task and requires understanding your business goals and putting a plan in place with clearly defined goals.

New Technologies

During the course of our research, Aberdeen explored the current and planned adoption of several interesting technologies that are either new to the warehouse market, or have undergone significant redesign in terms of application and capabilities. Some of them can be found in the core functionality of today's advanced WMS systems, while others are only available from niche providers. While these technologies are, in many cases, not yet at the threshold of adoption necessary to trigger our PACE methodology, a brief discussion of key elements will serve to show some of the other tools available to build the agile warehouse. These technologies include among others:

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- Slotting - the arrangement of items within the warehouse to facilitate optimized picking and put-away based on changing demand and related items.
- Yard Management and Dock Scheduling- optimizing the management of the key choke points in the warehouse: the dock and the yard, thus improving order turn-around times, cross-docking, and trailer management. Automated Yard Management Systems can track and prioritize inbound loads on a first-in/first-out basis. Dock doors can be scheduled and monitored in real-time, maximizing use of available unload resources. Further, integration of a Yard Management System with the Warehouse Management System maximizes dock resources, minimizes detention charges, and positively impacts the fill rate and back orders.
- Voice technology - replacing or augmenting mobile displays with voice instructions provided over headsets to warehouse workers.

Aberdeen Insights — Technology - New Opportunities

One way in which many DC Managers can create more agile operations and increase performance is by leveraging voice technology to direct workers throughout the warehouse, especially in order-picking. Over the past 10yrs the technology advancements around voice recognition and mobile device capabilities have made way for greater adoption of voice in industrial environments, particularly the warehouse. This technology now spans across industry verticals, geographical boundaries, and warehouse size or style. In fact, the focus on enhancing order-picking with voice technology has delivered tremendous savings to DC managers around the world on the magnitude of 15%-25% improvements in worker productivity while sustaining pick accuracy targets of well over 99%.

Because of the success of voice technology and the ROI delivered around order-picking, many of today's commercial WMS providers maintain integrations with voice technology vendors because of the value delivered by enabling their solutions to drive voice in the warehouse and increase overall efficiency of the workforce. The technology has advanced so much that the cost of integrating voice to any real-time WMS and utilizing ruggedized mobile devices has decreased over time and allowed DC managers to bring entire workforces online in a matter of weeks. Not only has voice driven results in order-picking, but many DC managers are rolling out voice technology to all warehouse operations including receiving, put-away, cycle counting, replenishment, loading, and cross-docking. By combining the business rules and value of the WMS and the technology around voice recognition, the interleaved/cross-trained workforce is more flexible, more agile, and moving at greater speed than the average distribution center.

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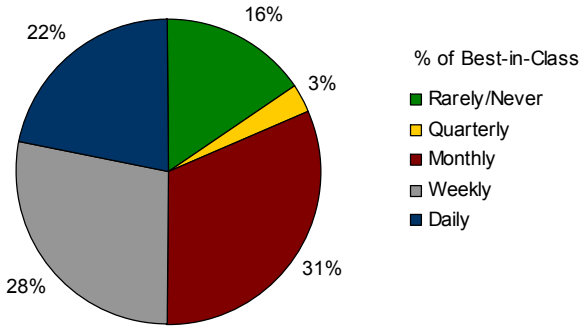
Performance Management

Transforming the warehouse to improve agility is a critical objective for Best-in-Class and Average/Laggards alike. However, achieving Best-in-Class status requires that performance metrics be established, data collected, and results communicated. Only by measuring can a process improve. This is reflected in the frequency with which Best-in-Class companies measure and communicate metrics to warehouse staff. Figure 8 shows that 81% of Best-in-Class companies do so monthly or more often. This compares with only 73% of Average, and 66% of Laggards.

Figure 8: Best-in-Class Communication Frequency



Source: Aberdeen Group, May 2008

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Chapter Three: Required Actions

Whether a company is trying to move its performance in warehousing from Laggard to Industry Average, or Industry Average to Best-in-Class, the following actions will help spur the necessary performance improvements. Success is not guaranteed by choosing to change one process or implement one solution; it must be looked upon as building momentum through a number of changes, some which are outlined below:

Laggard Steps to Success

- **Look to align business goals with operational strategies.** Before investing in any new technology or rolling out any new solutions, be sure to spend time identifying and understanding the long-term business goals of the corporation. Once proper alignment is established, begin to improve warehouse operations to increase customer order turnaround time. Aligning processes around order picking can help increase order accuracy and workforce utilization but one roadblock may be that less than 20% of Average warehouses know the contents of every bin in the warehouse. Inventory accuracy is crucial for improving the order picking process.
- **Increase Operational Efficiency with Central Process Control.** Of those companies considered best-in-class, 89% have established central direction of processes. With increased visibility and more collaborative process capabilities, fluctuations and disruptions can be minimized inside the DC helping to create more flexibility and agility. Begin to utilize cycle counting methodologies to improve inventory accuracy.
- **Use Automation to Increase Worker Productivity.** Identify areas of the DC where automation can increase worker productivity and efficiency. By adding conveyors and automated material handling equipment, manual-product handling time can be reduced, helping to optimize the workforce and cut down on non-value add material movements.

Industry Average Steps to Success

- **Evaluate the capabilities of your WMS and ensure its ability to support your long-term business goals.** Depending on where you are going from a business standpoint your current WMS functionality may not be adequate. Be sure to perform a cost-benefit analysis across multiple options (upgrade, customize, replace) to make sure your central process control mechanism can sustain a high-level of performance.

Fast Facts – The Laggards

√ 68% of respondents use spreadsheets to manage the warehouse.

√ Less than 20% are utilizing mobile devices in the warehouse.

√ 42% have no plans to implement labor management software in the future.

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- **Extend your WMS to the workers on the floor.** Look to capitalize on technology and implement rugged mobile computers for delivering work assignments and real-time information to your workforce. Increased accuracy and productivity are the results when you provide real-time instructions to your workforce. The visibility to inventory levels is also increased and customer order turnaround times can be decreased.
- **Turn up the speed of your warehouse.** Now that you've extended your capabilities and implemented enabling technology, re-evaluate your warehouse processes and look for new opportunities to fine-tune your DC engine. Begin by evaluating order picking procedures and implement zone, batch, or other picking schemes were effective to further drive down order processing times. Examine new ways to drive product replenishment to keep up with order picking. Less than 50% of Average DC's utilize advanced pick methods in the DC.

Best-in-Class Steps to Success

- **Expand the solution footprint.** Less than 20% of BIC respondents currently utilize labor management software capabilities, but over 30% are making it a focus in the next 24-months. In order to move your DC to the next level, BIC leaders should be looking for ways to better track their greatest asset, your employees. By gaining real-time visibility to activities in the DC, managers can more effectively balance their workforce and create more cross-operational opportunities; at the same time, employees can have greater visibility in real-time to their performance levels. In addition, yard management and dock scheduling, voice systems, and slotting optimization solutions compliment existing WMS technology while driving increased savings. Companies seeking to move to Best-in-Class must view the entire DC as a single integrated set of systems and processes, and deploy technologies that support this view.
- **Continue to leverage advanced technology and process capabilities.** Over 65% of BIC respondents are using mobile devices to direct order-picking in the DC but less than 40% are looking into or utilizing voice-technology for warehouse operations. In fact, over 40% off best-in-class respondents still use paper for receiving product into the warehouse. Mobile devices and advanced technology like automated material handling equipment voice technology and robotics can increase DC flexibility and help drive ROI and increase customer response time.
- **Continuously improve on last week's performance.** Being a Best-in-Class DC is not a goal to achieve and forget. Those who become BIC do so over time and through commitment; and it never ends. What worked well yesterday or last quarter may not work as well for tomorrow's business needs. Keeping the lines of

Fast Facts

The top three reasons that Average respondents site for not enhancing their WMS capabilities:

√ Upfront costs for technology are too high

√ Software integration is too expensive/difficult

√ Lack of executive level support for the project

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collaboration open between Corporate and Operations and across to IT are critical to not only improving performance in the DC, but ensuring that the business is synchronized and decisions are made to the benefit of all, not to some. Involving cross-functional teams for technology reviews and decisions will only increase the rate of adoption and the rate of success, guaranteeing maximum results from your investments.

Aberdeen Insights — Summary

As demand volatility and customer demands increase, companies are simultaneously trying to reduce inventory and supply chain assets. Distribution centers are being forced to increase their agility in order rapidly execute on a continuously evolving logistics plans. Aberdeen's research shows that this transformation requires attention to processes, technologies, infrastructure, and the integration necessary to make them work together. Achieving Best-in-Class status in this dynamic environment demands a willingness to change, and a commitment to continuously improve.

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Appendix A: Research Methodology

In May 2008, Aberdeen examined the use, the experiences, and the intentions of more than 150 enterprises using warehouse management software, material handling equipment, and warehouse technology in a diverse set of distribution, manufacturing, and retail enterprises.

Aberdeen supplemented this online survey effort with telephone interviews with select survey respondents, gathering additional information on warehousing strategies, experiences, and results.

Responding enterprises included the following:

- *Job title / function:* The research sample included respondents with the following job titles: procurement, supply chain, or logistics manager (29%); director (28%); senior management (12%); analyst (7%); consultant (10%); and general manager or staff (14%).
- *Industry:* The research sample included respondents from multiple industries. The largest segments included: Distribution (20%); Retail (18%); Food and Beverage (14%); and Transportation / Logistics (11%).
- *Geography:* The majority of respondents (70%) were from North America. Remaining respondents were from the Central/South America region (3%), Asia-Pacific region (10%); Europe (14%); and Middle East / Africa (3%).
- *Company size:* Thirty-eight percent (38%) of respondents were from large enterprises (annual revenues above US $1 billion); 46% were from midsize enterprises (annual revenues between $50 million and $1 billion); and 16% of respondents were from small businesses (annual revenues of $50 million or less).
- *Headcount:* Ten percent (10%) of respondents were from small enterprises (headcount between 1 and 99 employees); 38% were from midsize enterprises (headcount between 100 and 999 employees); and 52% of respondents were from large businesses (headcount greater than 1,000 employees).

Solution providers recognized as sponsors were solicited after the fact and had no substantive influence on the direction of this report. Their sponsorship has made it possible for Aberdeen Group to make these findings available to readers at no charge.

Study Focus

Responding executives completed an online survey that included questions designed to determine the adoption of the following advanced process and technologies:

- √ Implement Distributed Order Management to optimize fulfillment on an order-by-order basis
- √ Utilize Warehouse Management Software (WMS) with Service-Oriented Architecture (SOA) to rapidly create and automate new business processes
- √ Utilize warehouse labor management systems with strong forecasting capabilities to make better decisions regarding workforce deployment
- √ Utilize slotting systems to quickly asses and react to the impact of changing business conditions on warehouse location management
- √ Effectively utilize yard and dock management systems to improve order turn-around times and cross-dock more effectively

The study aimed to identify emerging best practices for warehouse optimization, and to provide a framework by which readers could assess their own management capabilities.

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Table 4: The PACE Framework Key

Overview
Aberdeen applies a methodology to benchmark research that evaluates the business pressures, actions, capabilities, and enablers (PACE) that indicate corporate behavior in specific business processes. These terms are defined as follows: **Pressures —** external forces that impact an organization's market position, competitiveness, or business operations (e.g., economic, political and regulatory, technology, changing customer preferences, competitive) **Actions —** the strategic approaches that an organization takes in response to industry pressures (e.g., align the corporate business model to leverage industry opportunities, such as product / service strategy, target markets, financial strategy, go-to-market, and sales strategy) **Capabilities —** the business process competencies required to execute corporate strategy (e.g., skilled people, brand, market positioning, viable products / services, ecosystem partners, financing) **Enablers —** the key functionality of technology solutions required to support the organization's enabling business practices (e.g., development platform, applications, network connectivity, user interface, training and support, partner interfaces, data cleansing, and management)

Source: Aberdeen Group, May 2008

Table 5: The Competitive Framework Key

Overview
The Aberdeen Competitive Framework defines enterprises as falling into one of the following three levels of practices and performance: **Best-in-Class (20%) —** Practices that are the best currently being employed and are significantly superior to the Industry Average, and result in the top industry performance. **Industry Average (50%) —** Practices that represent the average or norm, and result in average industry performance. **Laggards (30%) —** Practices that are significantly behind the average of the industry, and result in below average performance. In the following categories: **Process —** What is the scope of process standardization? What is the efficiency and effectiveness of this process? **Organization —** How is your company currently organized to manage and optimize this particular process? **Knowledge —** What visibility do you have into key data and intelligence required to manage this process? **Technology —** What level of automation have you used to support this process? How is this automation integrated and aligned? **Performance —** What do you measure? How frequently? What's your actual performance?

Source: Aberdeen Group, May 2008

Table 6: The Relationship Between PACE and the Competitive Framework

PACE and the Competitive Framework – How They Interact
Aberdeen research indicates that companies that identify the most influential pressures and take the most transformational and effective actions are most likely to achieve superior performance. The level of competitive performance that a company achieves is strongly determined by the PACE choices that they make and how well they execute those decisions.

Source: Aberdeen Group, May 2008

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Appendix B:
Related Aberdeen Research

Related Aberdeen research that forms a companion or reference to this report includes:

- Technology Strategies for Closed Loop Inventory Management; April 2008
- The Supply Chain Executive's Strategic Agenda 2008: Managing Global Supply Chain Transformation; January 2008
- Warehouse Management Software: Five Key Capabilities for Every Distribution Center; December 2007
- High Octane Warehouses--How Top Companies Use Capabilities Like Labor Management, Slotting, and, Speech-Based Warehousing; August 2007
- Industry Best Practices in Reverse Logistics; January 2007

Information on these and any other Aberdeen publications can be found at www.Aberdeen.com.

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