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What Can a WMS do for You?

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Executive Summary

Warehouse Management Systems (WMSs) are basic, tactical systems essential to effective supply chain execution and order fulfillment management. Any warehouse/fulfillment operation of moderate size and/or complexity will benefit from the installation of a WMS. Improvements in speed of response/fulfillment, order filling accuracy, inventory accuracy, and warehouse productivity are all reasonable expectations. WMSs are no longer considered leading-edge technology, but at the same time these systems are not trivial applications to install. Careful planning and implementation management with operational discipline is your key to project success.

We will discuss the following points to detail what you can expect from a state of the art WMS:

- What capabilities should you expect?
- What benefits should you expect?
- What makes WMSs difficult to execute?

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What capabilities should you expect?

Warehouse management systems can be divided up into three levels differentiated by the level of control they offer. Level 1 systems comprise data collection systems that are focused primarily on automating an inventory transaction between the warehouse and the customer's purchase order systems. While these systems serve specific purposes, enterprises should not expect them to manage complex warehouse operations. Level 2 systems add greater breadth and depth of functionality, and they are better able to support operations in midsize and large warehouses. Only the largest and most complex warehouse environments (typically including fixed material handling automation systems) can benefit from the expanded capabilities of Level 3 WMS systems.

Receiving: In a Level 1 system, receiving operations will record quantities received against specific POs. In addition, a more-complex Level 1 system allows multiple operators to receive against the same PO simultaneously. The Level 2 system provides more-robust validation and quantity-received checking as well as research capabilities to help ensure that the operator can easily identify the appropriate PO against which to receive.

Put-Away: The Level 1 system usually verifies where material has been placed; the Level 2 system provides put-away algorithms that tell the operator where the material *should* be stored. Level 1 lets operators create pallet loads in any configuration they wish; Level 2 gives operators advice as to how loads should be configured (based on SKU, vendor, unit of measure, or QC requirements).

Picking: Level 1 systems are typically "order pick" systems, and they will not support complex picking logic (e.g., walk aisle sequence or batch picking by wave, based on carrier loading plans). The Level 2 system also sizes cartons or pallets. The Level 1 system only allows for "pick logic" to be based on the set of rules it supports (i.e., Z picking or U picking).

Replenishment: Level 1 warehouse packages do not allow users to maintain complex replenishment rules. These packages support a simple minimum-level/maximum-level algorithm for forward-picking locations. The Level 2 system supports planned replenishment waves, manual replenishment requests, or "hot/demand" replenishments. In addition, they may support the automatic release of replenishment waves at specific times of the day. The timing of replenishment is critical to forward-pick-based operations.

Work Queue Management: Level 1 packages do not dispatch work activities between workers and equipment. In medium-volume and high-volume facilities, warehouse systems must not only identify where a product should be stored or moved, but also which worker and piece of equipment is best-suited for the task. Level 1 systems cannot do these tasks.

Fixed Automation Integration: Level 3 warehouse systems can interact with numerous material-handling devices. These systems have been designed to interoperate with sorting equipment, AGVs, conveyors and automatic storage-and-retrieval systems. Level 3 systems have device drivers and queuing subsystems that allow the exchange of data and workflows in real time. Level 1 systems cannot interoperate with these devices, because they are batch-oriented and have not been designed to support device-oriented workflow and the corresponding dispatch of work assignments.

What benefits should you expect?

Savings from a WMS implementation can be generated from eight possible categories. The benefits expectation should take a holistic view of each category and exhaust all opportunities within that area. Recognition must also be given to high level of interdependence between the categories. For example, "If I reduce four (4) fork truck drivers, I will probably eliminate a similar amount of equipment". As you work through your benefits look for the linkages. These categories are:

- Labor Reduction/Avoidance
- Equipment Reductions/Cost Reductions
- Space Utilization
- Inventory Reductions
- Transportation Savings
- Information Systems Cost Reductions
- Employee Related Benefits
- Customer Service Improvements

The following table provides greater detail of the savings potential.

Labor Savings	Best Practice/Benefit	Savings Metric
Receiving	- Streamlined paperless receipt/inspection of goods via RF terminal.	- # hours/cost for direct/indirect labor
Directed Putaway	- WMS automatically selects and assigns storage location	- # hours/cost for direct/indirect labor
Wave Generation/Shipment Planning	- WMS organizes pick requirement in optimal sequence, builds truckloads	- # hours/costs for indirect labor - Reduced cost of supplies
Picking	- WMS assigns picks via RF and optimizes assignment by method, batch, cluster, etc.	- # hours/costs for indirect labor - Reduced cost of supplies
Pick Confirmation	- Confirming SKU/location in replenishment and picking	- # hours/costs for indirect labor - Reduced cost of supplies - Minimizes freight costs

Labor Savings	Best Practice/Benefit	Savings Metric
Packing/Cartonization	- WMS selects correct carton based on containerization algorithms, pick into shipper	- # hours/costs for direct labor - Reduced carton costs
Manifesting	- In-line or manual 'scan and go' manifesting of ship labels with integrated carrier label generation, auto best way selection	- # hours/costs for indirect labor - Reduced cost of supplies - Reduced parcel freight costs
Shipping Document Preparation	- Online generation of "as shipped" truck, parcels, etc.	- # hours/costs for indirect labor - Reduced cost of supplies
Cycle Count/Physical Inventory	- WMS directed counting combined with year-round cycle countingy	- # hours/costs for indirect labor - Reduced cost of supplies
Equipment Cost Reductions	**Description/Logic**	**Savings Metric**
Elimination of Obsolete Equipment	- Remove the operator….remove their equipment	- Annual lease/rental cost
Eliminate Maintenance Costs for Obsolete Equipment	- Less equipment, no maintenance; parts and/or labor	- Annual maintenance cost for labor and parts
Reduced Cost for Existing Equipment	- Higher utilization rate leading to lower per hour cost	- Annual maintenance cost for labor and parts

Space Utilization Improvements	Description/Logic	Savings Metric
Eliminate Existing Overflow Space	- More efficient storage based on WMS storage optimization logic	- Lease/rental costs - Utilities, etc.
Reduced Transportation Costs with Elimination of Overflow Space	- No shuttling product to/from overflow facility	- Transportation costs
New Construction Avoidance	- Better utilization precludes new space	- Lease/rental costs - Utilities, etc.
New Transportation Costs	- Better utilization precludes shuttle costs	- Lease/rental costs - Utilities, etc.
Inventory Reductions	**Description/Logic**	**Savings Metric**
Reduction of Safety Stock	- Eliminate extra stock, increase turns	- Annual carrying costs
Reduction of Loss/Shrinkage	- Tighter inventory control by location	- Product write down cost
Reduction Shelf Life Loss Due to Expiration Issues	- Tighter inventory control by lot	- Product write off cost
Reduced Product Damage	- Minimized handling	- Product write off cost
Reduced Scrap/Rework	- Improved returns processing	- Product write off cost
Transportation Savings	**Description/Logic**	**Savings Metric**
Reduced Expedited Shipments	- Improved planning order reduce and shipment preparation with WMS	- Freight cost differential
Elimination of Pick/Ship Error Transportation Costs	- Improved pick/ship accuracy through scanning confirmation, better replenishment, etc.	- Return shipment charges - Product write-off.

Information Systems Cost Reductions	Description/Logic	Savings Metric
Reduced Legacy Support	- Less IT support based on efficient operation of WMS	- Personnel costs
Reduced Enhancements Costs	- Greater functionality in WMS package	- Development costs
Eliminate Legacy Equipment/Software	- Eliminate old legacy hardware and software	- Lease costs
Employee Benefits	**Description/Logic**	**Savings Metric**
Improved Morale	- Higher operational efficiency due to better on time, attendance and/or work days	- Replacements costs
Reduced Supervision	- System directs high % of activities	- Indirect costs for management
Reduced Training	- Less turnover due to desire to work with system	- Cost to retrain staff
Reduced Turnover	- Less turnover due to desire to work with system	- Reduced HR costs for finding and hiring replacement staff
Reduced Accidents	- Greater awareness of operations due to WMS, less congestion	- Cost per accident for off time, etc.
Customer Service Improvements	**Description/Logic**	**Savings Metric**
On-Time Delivery	- Improved order processing based on required delivery date	- Expediting costs - Cost for returns process
Customer Satisfaction	- Access to WMS data for CRM purposes	- Incremental sales
Reduced Penalties	- Fewer charge backs from vendors - Better compliance	- Vendor/client charge backs costs for compliance, on time delivery

What makes WMSs difficult to execute?

Warehouse system failures are most often due to problems common to many IT initiatives. Enterprises should learn from the experiences of these other system implementations so they can avoid repeating mistakes when they implement their warehouse system.

Physical and Design Issues

Bad warehouse layouts will cripple the best systems. Simulate the planned layout (i.e., the physical arrangement of aisles and storage areas) in advance to ensure it will meet the enterprise's throughput requirements.

Technology and System Issues

Most technologically conservative enterprises should avoid "unproven or experimental" technologies. "Unproven or experimental" technologies are defined by the vendor's experience and installed base, not just industry norms. For instance, client/server applications are proven in the industry, but enterprises should avoid being the first customer of a vendor or application that uses client/server technology. Web services is another example of a technology that is just gaining some acceptance but does not have an established track record in the WMS arena. Use these "unproven or experimental" technologies only when willing to accept the risks and startup difficulties associated with these technologies, and only when these technologies are consistent with the enterprise's future IT plans. Technologically aggressive clients are willing to take these risks. When using unproven or experimental technologies, negotiate pricing discounts to mitigate the implementation risks and to provide compensation for the additional disruption such startups entail.

Enterprises must be able to size their warehouse systems accurately. Prepare detailed histograms of all key performance demands to determine peak-hour requirements for the target year. Seek a vendor that has sizing tools that translate these peak-hour demands into specific hardware requirements, and insist that the vendor guarantee it will deliver a system that meets these requirements for the life cycle of the installed system - not just the startup. Many systems are initially undersized because there was no solid requirements analysis, or because sizing decisions were based on averaged data.

Vendor Issues

Vendor success may be the customer's demise. In purchase contracts, the client should require the vendor to provide specific "involvement details" (effort over time for the duration of the project) that it will guarantee as minimum involvement for each senior manager required (i.e., the vendor relationship manager, project manager and software modification team leader). Many warehouse system vendors are growing quickly, but high growth often means new project managers, scarce resources and an inability to manage schedule slips. Develop close personal relationships with each senior manager of the team the vendor assigns. These people will play a large role in making the project successful. Both sides benefit when these relationships are cultivated.

Vendors are not the only contributors to a stable project team environment. Enterprises should assign their own staff to the project team - *for the full duration of the project* (i.e., vendor selection through project startup).

Project Management Issues

Do not allow the project's scope to "creep." Before selecting a vendor, insist on an itemized list of modifications. Most clients use the functional specification process to better-define the product modifications required to meet the business needs. This often opens the door to "nice to have" functions and modifications, and it helps define the anticipated modifications in greater detail. By having a modifications list before choosing a vendor, the client can make an educated decision as to what has changed since the vendor was selected. The enterprise can then require the vendor to provide updated cost and schedule information that reflects the changes. Then, the enterprise can select the specific modifications needed to accomplish the business requirements, and stick to that list.

Manage schedules. Implementation projects are being driven by warehouse operations organizations, not IS organizations. Neither customers nor vendors are good at managing *all* aspects of an implementation project. The vendors focus on software development, not project implementation. The customers are inexperienced in software development and implementation. As a result, customers must manage the vendors *and* the project. Insist on detailed project plans from the vendor, with weekly or biweekly updates. Prepare detailed plans for the enterprise's own activities, and integrate them with the vendor's timetable. Synchronize the enterprise's efforts with the vendor's. A simple schedule slip by the vendor or customer may not be a linear event. A one-week slip may grow into a five-week or six-week delay because resources are unavailable, or because successor tasks are delayed in a "domino effect." If the vendor and customer schedules are not integrated, updated regularly, monitored and managed, the project will slip.

Do not sacrifice testing and phased startups to compensate for schedule slips. Our implementation experience notes that many enterprises take short cuts to fix schedule slips - and then later realized these short cuts led to a lot of the difficulties encountered during startup. Conduct a "go vs. no go" assessment prior to trusting the business to the new systems. Test functionality incrementally by module (e.g., receiving, put-away, order management, picking and then shipping), and incrementally by volume within each functional grouping, before rolling the project out across all warehouse functions.

Give yourself control.

Enterprises that have simpler functional needs, or that are not overwhelmed by the physical metrics of their warehouses, should consider using a Level 1 system to automate receiving, put-away, picking and packing within a warehouse. Level 2 systems are better for enterprises that have physically imposing operations, broader functional requirements in general, or complex requirements within one or more functional area. Benefits can be received in some or all of the eight categories with actions taken in any one area generating benefits in multiple categories. WMS implementations with rates of return in the 20-40% range are realistic. By the same note, WMS implementations that fail to prepare each facility involved prior to the implementation, that fail to adequately test the new combined software and methods/process, and fail to properly train the warehouse staff will fail, producing a negative rate of return. Taken seriously, WMS implementations will give you the ultimate state of control.