Softeon

GLOSSARY
the ABCs of WMS

An easy-to-read index of Warehouse Management System, Implementation and Processing terms.


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LEARNING THE LINGO

As with most areas of special knowledge, **Warehouse Management Systems (WMS)** are associated with many terms and acronyms. Even experienced practitioners may not be conversant with all the terms, and less experienced managers or stakeholders outside of distribution may need a guide to navigate the WMS lexicon.

This glossary provides an explanation for almost 90 WMS terms, from ABC Classification to Zone Management - a great resource for your WMS project.


A

ABC Classification

Classification of groups of SKUs based on velocity, such as units shipped per month or some similar attribute. The SKU portfolio is then split into perhaps three classes labeled A, B, and C - from fast-movers (A's) to slow-movers (C's). Sometimes, more than 3 groups are defined, such as adding a "D" group. This categorization is used in several ways, such as in which locations products will be put away once received, or how SKUs should be slotted in forward pick areas. Importantly, velocity can vary by unit of measure (e.g., pallet, cases, "eaches") for the same SKU. Velocity is also subject to seasonal variations, or may change over a product's lifecycle. A WMS can receive velocity categorization from another system such as the ERP, or it can calculate and assign velocity codes based on actual warehouse operational data.

ASN (Advanced Shipping Notice)

An electronic communication that details what is to be expected on a incoming receipt. This often allows receiving and/or allocation processes to be streamlined. There is a specific EDI message (an 856) that provides a standard for ASN messages, but in practice, the ASNs can be formatted in many ways. Potential efficiencies include scanning a single identifier on an incoming pallet based on ASN data that details the contents of that pallet. The same concept applies to a carton, or even a full trailer. If the ASN indicates the quantity that was actually shipped by the vendor for a given SKU is less than ordered, it can allow changes to allocation of that receipt, such as which stores received the shorted item and by how much, or change production schedules if the item is needed for a production run.

ASN Receiving

A process in which the receiving of items in a distribution center is streamlined by communicating what items are coming in advance of actual arrival. For example, the ASN may tie unique barcode IDs on a pallet or carton to their contents, so that an operator can simply scan that barcode to fully receive that handling unit, bringing in all the product details, and substantially speeding the receiving process.

Audit Trail

An electronic record that leading WMS solutions maintain of all activities/transactions in DC operations, including receipts, put-aways, cycle counts, order picks, replenishments, packing, truck loading, etc. The record contains all the details of which associate did what and when. This data can be accessed for investigating problems or errors and serves as the basis for worker productivity reporting.

Autonomous Mobile Robots (AMRs)

A somewhat new class of DC automation in which robots self-navigate to accomplish work. There are mobile robots for piece picking, case picking, and pallet picking (robotic AGVs), with different capacities (weight/cube), and storage configurations. Piece picking mobile robots generally work by meeting a picker at a location. The worker is directed to pick items into a carton/tote being carrier by the robot. The same worker may be asked to pick another item if it is nearby. If it is further away, the robot may be directed to meet another picket, the process repeating until the order is complete and the robot moves the items to packing. Another version of this is to use a robot that can pick up a pick cart with multiple slots," enabling "cluster picking," or picking the same item for multiple orders assigned to the cart, reducing travel time.

Batch Picking

A pick method in which all picks for a given SKU are completed together, so that a picker only has to stop once at the storage area per time period, reducing travel time. For example, for a release of work such as in a pick wave, customer A may need three cartons, customer B six cartons, and customer C five cartons. With batch picking, a picker would be directed to the storage location and instructed to pick 14 cases, satisfying all three orders. Of course, with consolidated via batching picking, it means the picked product must be distributed to each customer downstream from the pick, either as a manual process, or commonly using a sortation system to divert the right number of cartons for each order down the assigned lines for pallet building. Batch picking can also be used for piece picking, such as selecting all the items needed across customers at one stop of the storage location, with packers then receiving the batch and distributing them into the shipping cartons. This method is often used for picking single line-item orders.

Blind Receiving

A receiving process where no reference information, such as a purchase order or advanced ship notice, is used to process the receipt, meaning all the information relative to the receipt must be entered manually or via barcode scan. Blind receiving may be necessary when no such documents come with the delivery, or as a way to force receivers to validate details through inspection rather than just accepting purchase order details as valid.

C

Cartonization

A WMS capability that assigns specific SKUs in an order to a tote or shipping carton, and then suggests the most efficient carton size to use to minimize shipping costs. Cartonization can actually involve sophisticated heuristics, based on item dimensional data, company and/or customer rules about which items can go in each carton (e.g., incompatible products such as fragrances and apparel, or a retailer's ordering department), and finally minimizing total travel distance within those rules. Some WMS vendors also offer three-dimensional cartonization, which can provide a visual display of how a complex carton packing scenario can be executed with the smallest possible carton size.

Case Picking

The process of picking full cartons or cases of product, as opposed to full pallet or "eaches" picking.

Chargebacks

Financial penalties from customers, notably in the retail sector but increasingly by other types of customers as well, for various shipping offenses, which can include improper labeling, improper packing, short shipments, early or late shipments, and others. These penalties can result in some substantial fines (usually as a percentage of the total invoice for that shipment) and is often a key element in WMS cost justification.

Cluster Picking

A pick method, typically involving piece picking and pick cart, in which a picker picks items for multiple orders from the same location to reduce travel time. For example, consider a picker with a cart that has room for nine orders, represented by carts or totes. The WMS directs that picker to a location for which one or more orders are being processed on that cart. The WMS would instruct the picker to select one or more items for the first tote/carton that needs that SKU. After the first pick is confirmed via barcode scan, key entry or pushing a lit button, the picker would be directed to pick another item or items from that location for the next carton/tote requiring that SKU until all the picks for that SKU have been exhausted, and the picker is directed to another location for another SKU to pick.

Compliance Labeling

Customer-specific shipping labels, typically at the pallet or carton level, with specific requirements for what data is printed, the overall format of the label, the barcode format and placement, as well as other requirements. The term is commonly associated with requirements from retailers, which feature a unique barcode identifier, known as a GS1-128, that is to be printed on the label. Failure to print and apply the right compliance labels can result in a customer chargeback.

Countback

A technique popularized many years ago in the food and consumer packaged goods industry, in which after a case pick is completed, the RF gun immediately prompts the picker to enter the number of cartons left on the pallet from which the cases were picked from. This is typically accomplished by a simple entry of the number of full layers and loose cases on top, matched against a known pallet configuration. If the picker count matches the WMS count, the picker moves to the next location. Though seemingly a hit to productivity, the technique was created because of the conflict between manufacturers and 3PLs running their distribution centers over inventory accuracy and “lost” cartons. The count back process just takes a few seconds, and almost eliminates case picking inventory discrepancies.

A process where incoming goods are not put directly into storage, but are taken directly to some type of outbound staging area for customer shipment instead, saving the labor time of first putting away and later picking those items. Within that basic construct, there are three primary types of crossdocking: (1) Planned crossdocking, where there is visibility to the expected receipts, meaning the WMS is aware and executes a crossdock when the goods arrive. This is common in the retail sector, especially for DCs using a "mark for" approach in which vendor shipments that go to a retailer DC but are "marked for" a specific store can be used in other sectors; (2) Opportunistic crossdocking, where the WMS determines there is open order for a received item, and figures that it can be shipped directly without being put away first; and (3) Distribution crossdocking, generally applicable in a facility created for the express purpose of crossdocking, such as where full truckloads of goods are received, then crossdocked to various smaller trucks for local deliveries.

Crossdocking

The term "crossdocking" is sometimes used as a synonym for "flow through," yet in reality they are really different processes. Crossdocking sounds great in concept, but outside of some retail and distribution, crossdocking scenarios if difficult to execute due to timing issues, especially with the other items on an order.

Cube Utilization

The percent of storage utilization, generally measure in terms of the percent of reserve inventory storage areas that are being used. When the space is completely filled with product, the cube utilization is 100%. The term is also used to measure how much of a truck trailer's capacity is being used on an outbound load. A WMS should be able to provide metrics on warehouse cube utilization. In warehousing, it is a measure of the utilization of the total storage capacity of a vehicle or warehouse.

A low level of cube utilization can be a sign that there are many partial pallets being stored, which could be an opportunity for the WMS to drive consolidation of those partially filled locations to free-up space.

Customer Portal

Generally a web-based application as part of the WMS that allows a company to securely make distribution data accessible to their customers. Typically, that data might include inventory levels and shipment information. Customer portals are almost an essential capability for third-party logistics providers.

Cycle Counting

A process of counting, verifying and adjusting inventory in defined sections of a full warehouse, as opposed to a full physical inventory of all items in the distribution center. A WMS should be able to create cycle count tasks based on location ranges, item velocity, item value and other attributes, and ensure that all locations are being counted over some set period of time (e,g, six months).

Dimensional Weight (DIM)

Dimensional (DIM) weight refers to how dense a package is, or the amount of space a package occupies relative to its actual weight. The classic example of a low-weight, high-volume shipment is a box of ping-pong balls — they occupy a disproportionate amount of space relative to their weight. Parcel carriers use DIM weight to ensure fair payment for shipping parcels that are relatively light for their size.

The actual billable weight of a parcel becomes the greater of the dimensional weight or the actual weight. The dimensional weight is calculated by dividing the cubic size of a parcel in inches (the product of multiplying your package's length x width x height) by a factor provided by the parcel carrier (subject to change).

Direct Time

Work related to the main function of a distribution center such as receiving, putaway, order picking, etc., that can be timed and measured to report on worker performance.

Directed Putaway

A process in which the WMS determines where a given receipt of goods should be stored in the distribution center. Directed putaway is tightly connected to the concept of “zoning” in which storage locations are group together, examples being “fast-movers” or “HAZMAT” products. With direct putaway, companies use a WMS to configure a hierarchical set of rules to identify the best location to store a receipt of inventory. If there is no space available in the preferred zone (e.g., fast-movers), the WMS would look for the next best available zone (e.g., medium-movers). Typically, a warehouse associate would receive a message on a wireless device informing him or her of the preferred storage location, which would be confirmed with a scan of the location bar code as the product is putaway. In some cases, the associate may be asked to put some of the received inventory directly into a forward pick location rather than reserve storage, say if the warehouse was previously depleted of that SKU before the receipt.

Discrete Order Picking

A basic picking method in which an order picker is tasked with fully picking a customer order him or herself. This is the way many distribution centers picked orders before the introduction of a WMS, which can enable more advanced methods such as batch or cluster picking, pick and pass/zone picking, assigning order picks to one associate for pallet picking and another for cases picking, and other techniques.

Dock Door Management

A WMS (or sometimes Yard Management System) capability that manages the process of assigning inbound and outbound trailers to specific dock doors for a specified period of time. That time slot length may be determined by a profile of the trailer contents matched with productivity standards.

Dynamic Slotting

A technique available in some Warehouse Management Systems in which a forward pick location is created dynamically, rather than being dedicated to a single SKU. This is needed in two primary situations: (1) when there aren't enough pick locations to handle all of the SKUs; or (2) when demand for the SKU in a wave or general order pool far exceeds the storage capacity of the forward pick location for that SKU. In either case, a WMS can create either a temporary primary location in the first scenario, or a secondary location – even a floor location – in the second scenario. Generally, picks are first directed to the new primary or secondary pick slots. When the work is done, the slot is freed to be used dynamically by another SKU. This is considered an advanced WMS capability.

Engineered Labor Standard

An approach to dynamic productivity that defines the time necessary for a trained worker, working at an acceptable pace, under capable supervision, and experiencing normal fatigue and delays, to do a defined amount of work of specified quality when following the prescribed method for that task. A variety of factors can go into this standard, such as travel distance, product quantity or the unit of measure being handled, reach and/or grab time, the position of the item in storage or a forward pick area (e.g., chest high versus near to the floor) product weight, fatigue increase as the day proceeds, and more. The standard is determined dynamically based on the specifics of each task, which can then be grouped together, such as with a series of case picks for a single customer pallet.

Event Management System (EMS)

A software application that monitors activity and transactions in a distribution center and triggers workflow or alert messages based on pre-defined triggers and thresholds. So, a message could be sent via email, text message and/or desktop alert if throughput falls below the targeted level, or when each truck is closed, as just a couple of the many potential examples of events that could be used. Companies can use third-party event management software, but some WMS providers include an internal EMS as part of their solution.

Expiration Date Management

An inventory control technique that is triggered by a product's expiration date. The WMS should provide the ability to automatically calculate an expiration date by product category, based on an actual manufacturing date, or often the received date as a proxy. The WMS would then enforce the different rules customers have defined relative to that product's shelf life in the inventory allocation process. It should also provide different tools to view the product in a DC by remaining shelf life.

FEFO (First-Expired First-Out)

An inventory management technique in which the product that has the earliest expiration date is allocated for a new customer order. One of the most common types of inventory allocation rules. Note: some customers can have challenging rules around expiration dates, with different expiration date “windows” and other rules that make straight FEFO allocation not possible.

FIFO (First-In First-Out)

An inventory management technique in which the product that was received the earliest is the product that is allocated for a new customer order. This is the most common type of inventory allocation rule.

FILO (First-In Last-Out)

An inventory management technique in which the product that was most recently received is the product that is allocated for a customer order. Though not common, FILO is sometimes used for international shipments with longer lead times, or for inventory that must be moved to offsite storage.

Flow Through

Similar to crossdocking, but generally thought to have a different meaning, especially in retail distribution. With crossdocking, received goods are taken directly to outbound shipping lanes. With flow through, received goods are required to be processed before being shipped. This is similar to crossdocking as the received items are not put away. A common retail example is the practice of receiving full cases of goods and then sorting individual items from those cases for different stores, sometimes using automation such as a tilt-tray sorter. Other times, some sort of service (labeling, packaging, etc.) must be performed before the product can ship.

Follow Me Staging

A technique in which an operator or supervisor selects a staging lane for the first pallet in a full truckload or less than truckload shipment. With that anchor, the WMS then directs all other pallets for that shipment to the same staging lane. This approach differs from WMS-directed staging for the first pallet, either directly or from a dock door scheduling system.

Forward Pick Location

Locations set up specifically as an order picking area, typically for piece and case picking. These locations are often dedicated for each SKU. The forward pick areas are generally replenished by inventory from reserve or "forward reserve" locations.

Forward Reserve

A replenishment technique where Inventory to replenish SKUs in forward pick areas are stored nearby (usually above) those SKUs. Can be part of a two-stage replenishment strategy in which forward reserve areas are replenished from regular reserve, and then used to replenish forward pick areas. The benefit is that it speeds the replenishment of forward pick locations, but perhaps at the cost of an additional pallet touch.

Hard Allocation

A WMS process in which the specific location where an item to be picked from is assigned. The hard allocation reserves the inventory in the location for those orders that have received inventory allocation.

This process contrasts with “soft allocation,” in which inventory is reserved at the warehouse level - not in a specific location for picking.

Honeycombing

A warehouse scenario where there are many partially full locations. This generally happens when either cases have been picked from a location, or product is received and putaway in a location that can hold more than was putaway. Some honeycombing is to be expected, but it increasingly reduces effective storage capacity. The level of honeycombing is measured as total cube stored divided by total cube of storage capacity in the warehouse. A WMS can help with honeycombing by: providing visibility to the extent of the honeycombing; enabling multiple SKUs/LPNs to be stored in the same location; supporting “rewarehousing” moves (consolidating inventories from different locations); and using“pick to clean” techniques that emphasize emptying partial locations when allocating inventory.

An increase in wages for a distribution center worker's pay based on exceeding baseline performance standards. The idea is that the labor savings created by a worker exceeding standards are partially shared with that worker, as an incentive to maintain that high-level of performance over time. The amount of savings that should be allotted to workers is sometime a matter of internal debate.

Incentive Pay

Indirect Time

Refers to work that is not associated with normal distribution center work (receiving putaway, order picking, etc.,) such as meetings, maintenance and clean-up. No standards for performance are typically set, but tracking indirect time can reduce the amount used.

Inventory Turns

A measure of how fast inventory is "turning" for a company over a certain period of time. It is most commonly calculated as the cost of goods sold divided by the average level of inventory on-hand, or sometimes by a snapshot at some period, such as end of year. So, turns is equal to the cost of goods sold for a year divided by year-end inventory levels. Inventory turn levels vary wildly across sectors and individual companies, from well over 100 for fast food restaurants to mid-to-low single digits for some types of retailers and manufacturers.

Item Master

A collection of data that describes the attributes of each item handled by the warehouse, including its name, description, weight, dimensions, unit of measure, if it requires lot/batch or serial number tracking, and much more. For foundational WMS data, look for a rich array of SKU attributes and many user-definable fields.

Kitting/ De-kitting

Kitting is the process of combining two or more individual items/ SKUs into a one new item for shipping, with the kitted package often receiving its own SKU number. A WMS should be able to manage the kitting process while maintaining visibility into the component SKUs of the kit. De-kitting Is the reverse process, returning kitted SKUs into individual items, often needed when kits are returned, or more kits were created than were actually needed.

Labor Management (LMS)

Generally an add-on module to a WMS, an LMS (or Resource Management) will provide detailed productivity reporting by employee and warehouse task type. It should also track “direct time” (tasks directly related to receiving, putaway, order picking, cycle counting, etc.) versus “indirect time” (meetings, clean up, battery changes, etc.). The labor reporting is often set against a performance standard, so that productivity is reported as a percentage of the standard. To determine the standard, the LMS will consider travel distance, the type of task (e.g., case versus piece picking), specifics of the task (e.g., how heavy the cases are), and other factors. The LMS should be capable of showing worker expected goal time for a block of tasks, such as case picks to a pallet.

Lean Time Replenishment

Replenishing forward pick locations in off-shifts, usually in order to fill them to max capacity so that they are ready for the start of the next shift that will perform order picking. The WMS should be able to automatically schedule and release the work to execute lean time replenishment.

License Plate Number (LPN)

A unique identifier in a barcode (or RFID) form for a given handling unit – commonly a pallet – that is used to track that handling unit throughout its lifecycle. LPN barcodes can be pre-printed for use or printed on-demand as needed. In some scenarios, a pallet has an LPN, and individual cases on the pallet also carry LPNs, or there can be a master LPN on a pallet under which there are more than one LPN. In the latter scenario, the pallet might be put away as is, or the individual LPNs can be put away separately in different locations.

Location Master

A foundational WMS set-up tool that defines different groups of locations and the attributes of those locations, such as its cubic capacity (or any other unit of measure), what types of products it can contain (e.g. HAZMAT), as well as many other variables. Along with the Item Master, aka the repository of WMS metadata.

Lot Control

Synonymous with “batch” control, lot control involves tracking the production lot or batch number of the inventory for quality assurance reasons, supporting a potential need to put a lot on-hold, support a recall process, reduce customer manufacturing variance and more. A WMS should have strong capabilities around lot control, including the ability to track lots of inventory from receipt through shipping, controlling when and if lots can be mixed, the ability to allocate by specific lot numbers and more.

Material Handling Equipment (MHE)

A term that simply refers to a broad range of mechanized systems, such as conveyors, sortation systems, Automated Storage and Retrieval Systems (AS/RS), carousels and many more. Usually requires integration with the WMS so that it can direct the MHE.

OTIF (On-Time In-Full)

A distribution center metric that tracks the percent of orders shipped complete as ordered and on-time. Similar to the concept of “The Perfect Order.”

Pallet Pick

Orders or parts of an order picked in full pallet quantities.

Perfect Order

Though there are a number of specific definitions for this term, it generally refers to an order that is shipped complete, on-time, and with all of the correct labeling and shipping documentation. Is a frequently used as a metric – what is the percent of perfect orders out of the total for a given time frame. The concept/metric of “On-Time, In-Full” (OTIF) is similar.

Physical Inventory

A process in which all the inventory in a distribution center Is counted and reconciled. A WMS should be able to drive the cycle counting process. Because physical inventories are expensive and usually involve shutting down the DC for multiple days. Instead, many companies use the WMS to do regular cycle counting and eliminate physical inventories, though this process is still required by some companies.

Pick and Pass

A process in which forward piece-picking locations are grouped into zones, and operators in each zone pick items into a carton or tote in their zones, and then “pass” the carton or tote to a picker in the next zone, often assisted by a roller conveyor. A WMS should support pick and pass processing.

Pick by Label

A picking technique in which workers are given a batch of shipping labels in picking location sequence with the location for each pick printed on the labels. The picker applies the label as each carton is picked, for example to a pallet jack. Historically pick-by-label was used for case picking, but it is now also seen for some e-fulfillment applications.

Pick Path

The route an order picker should take through storage areas when selecting orders. A good WMS should provide multiple pick path options, including “zig-zag,” “serpentine,” “forward and reverse,” among others, and then optimize the actual pick path based on algorithms to minimize travel time. This is generally executed by the instructions from the WMS sent to the picker via a wireless terminal.

Pick Module

A mechanized approach to case or piece picking where inventory is most commonly stored on both sides of a powered conveyor. Usually, there are multiple levels of pick modules, often 2-4. As picks are completed, the cartons or totes are placed on the conveyor for takeaway, either to another zone (for piece picking) or level, or to shipping for completed piece picks or full carton picks. There are many permutations to this basic theme, such as whether the transfer of the totes to different zones is mechanized, whether a carton/tote can recirculate at the end back to an earlier zone where a pick was shipped and more. Pick modules are closely associated with downstream sortation processes after cartons leave the pick modules.

Pick-to-Light (PTL)

A technology primarily used for "eaches" order picking that can drive significant gains in productivity by its "hands free" nature. In a typical operation, a picker will scan a carton or tote ID barcode. That action will light a numeric display in a group of locations, indicating the specific location to pick from for each location and how many items are needed. The picker moves to the first location, places the indicated quantity in the tote/carton, and then pushes a button to indicate that pick is complete. He or she then repeats the process until all the picks in a zone are complete. Lights can also be placed on a pick cart, turning it into a "smart cart." Pick-to-Light is closely related to the concept of Put-to-Light.

Piece Picking

Picking of individual items or "eaches," as opposed to full case or pallet picking. This process has grown more prevalent due to the rise of e-commerce, with many companies now required to do piece picking for the first time. This is factor of growing importance when adopting a new WMS.

PO Receiving

The process of receiving inventory, generally using handheld RF terminals, against the expected items and quantities per the purchase order. The WMS should be configurable in such areas as setting the allowed thresholds for how large a shipment overage on a SKU can be, or to be able to receive multiple times against a single PO over a period of time.

Print and Apply (PANDA)

Equipment that both prints and then applies a barcode label to a container, generally a shipping carton. This automates the label application process and is very common in printing retailer compliant shipping labels (GS1-128) or carrier compliant parcel shipping labels. There can be questions about which system should manage the PANDA function - the WMS or a separate control system, such as a WCS. This somewhat depends on the particular WMS capabilities in this area.

Put-to-Light

A technique similar to pick-to-light in which lights direct workers to place SKUs into shipping cartons or totes after they have been batch-picked. For example, a picker has 10 items of a given SKU, and the lights indicate to put one item in carton 1, two in carton 3, and so on.

The “puts” are confirmed by pressing a light on the location display, making the operations “hands-free.” This has become increasingly popular for e-commerce order processing using put walls, where items are put with light direction on the front side of the wall, and then packed from the back side of the wall once all puts are complete. Prior to that, put-to-light was most common in retail applications where items were put into totes for specific stores.

Radio Frequency (RF)

Use of wireless mobile terminals by the WMS to issue instructions to workers about what to do next and to get input back through barcode scans or key entries by the operator. The term “RF” goes back decades, from the then use of what was termed “radio frequency” technology to enable mobility, which today we think of as Wi-Fi. It was the use of RF terminals for real-time communication with warehouse software that really defined what was meant by a WMS.

Radio Frequency Identification (RFID)

A technology that uses a wireless chip to identify and track inventory. In warehouse applications, what is called a passive RFID tag is energized by the RFID reader device (handheld, mounted on a conveyor, a portal reader on a dock door, etc.) and sends data, such as an LPN or carton number, to the reader and subsequently to the WMS. Can, to an extent, be thought of as a wireless barcode. RFID is still minimally used in distribution applications.

Real-time Locator System (RTLS)

A technology where inventory containers, such as a pallet, are tagged with an “active’ RFID tag (meaning a tag with a battery that regularly broadcasts its identification). Labor and equipment can also be tagged. A series or readers collect those signals and triangulate them to identify the asset’s location. This can be useful if the WMS supports minimizing aisle congestion, identifying the right asset to assign a task to based on proximity, and/or to make sure the correct worker is interacting with the correct mobile robot through a “pairing” function using the RFID tags.stores.

Replenishment

Restocking forward picking areas with inventory from the reserve storage locations. There are a number of options for accomplishing this, many often used in combination. These include basic “min/max” logics, replenishment based on demand (for example associated with a “wave” of order picks, “lean time replenishment” and more). The WMS should be able to hold the release of picks to areas where there is insufficient inventory until the replenishment has been completed. Units of measure are key. For example, a forward case pick area may be replenished with full pallets, while split case picking locations may be replenished with full cases. Replenishment challenges are critical and can “make or break” a new WMS deployment. A common challenge is when the needed replenishment quantity exceeds the capacity of the forward pick locations. There is no easy answer to this challenge, but one solution can be for the WMS to create dynamic (temporary) locations to hold the extra inventory, with those locations being “consumed” when the picks are complete.

RMA (Return Merchandise Authorization)

An identification of an approved return from a customer - generally a unique number - that can be used to accept and process an actual return versus what was approved for the return.

Shelf Life

The amount of time after which inventory in a DC is considered expired or non-sellable. The WMS should be able to assign a standard shelf life to each SKU or SKU group, allocate inventory based on a customer's acceptable shelf life or expiration date windows, and provide visibility to the shelf life by SKU/location based on either production date or received date into the DC.

Simulation

This involves taking company data (e.g., several weeks of actuals orders, or today's expected orders from a forecast) and then, in an instance of a WMS, the orders are "played out" as if they were live orders to see the results.

WMS simulation can be used to test process adherence (e.g., retail compliance adherence), to test the impact of WMS configuration changes on cost or performance, or to understand resource requirements and the assignment of resources for a shift's expected work.

Only a few WMS solutions have a simulation capability.

Slotting Optimization

The process of assigning SKUs to forward pick locations. The assignment is often based on velocity – for example, putting full cases of fast-movers nearer to shipping areas, or placing fast moving piece pick SKUs in the chest-high "golden zones," with slow-movers at the bottom-level that take longer to access. But there are many other potential considerations. For example, it may be better to assign some fast-moving SKUs to multiple locations in forward pick areas to minimize congestion. It may also be smart to slot items closer together that are frequently ordered together.

In case picking, some companies slot products from heaviest to lightest to minimize product damage. Some slotting processes can be very simple, but others require significant mathematics to optimize the result. Not all WMS solutions support advanced slotting applications, which can also offer cost-benefit analysis about the value of making slotting directives from the WMS.

Smart Carts

Refers to pick carts that employ pick-to-light technology on the cart for piece picking, with lights below each carton or tote on the cart to indicate what containers need how many of each SKU being picked. The "put" for each container is confirmed by simply pushing a button. This can create greater productivity because it is generally faster than looking at a wireless terminal for what to put next combined with barcode scanning.

Soft Allocation

A WMS process in which orders are sent to the WMS from the ERP or other order management system, often days or weeks in advance of when they are needing to ship. Some WMS solutions are able to reserve inventory for those orders at a warehouse level, meaning it can prevent subsequent orders from "grabbing" that reserved inventory. That said, a WMS should have the flexibility in applying soft allocation, such as not reserving inventory shipping more than two weeks out, as that could cause nearer term orders to be short-shipped. Soft allocation is often performed by the ERP system, but for companies without that ERP capability, a WMS that can do soft allocation (as contrasted with "hard allocation" of specific inventory locations for order picking) can offer significant advantages.

Stop Sequence Loading

A WMS capability that takes data from the WMS itself or a third-party Transportation Management System (TMS) about the loading plan for an outbound truck trailer. That could include weight considerations as well as the stops that truck will make.

Task Interleaving

A WMS capability in which the same worker is directed to perform consecutive tasks of different types, rather than repeating the same task. The classic example of this is a full pallet putaway followed by a pallet replenishment for a case pick area coming from a reserve location near to the putaway location.

The idea is that total travel distance is reduced by the reduction in “dead-heading,” meaning a forklift driving with no load. Task interleaving is talked about quite a bit, but it is used less often than many might think due to layout issues and added complexity.

Task Management

A core WMS capability that involves creating, managing, and optimizing work in the DC. There are many types of tasks in a distribution center: putaways, order picks, replenishments, truck loading, etc. The WMS automatically creates these tasks, such as picking and replenishment tasks, and queues them for assignment to specific workers based on factors such as the work zone they are in, permissions to do a task, the type of equipment (if any) they are using, the priority of the work (e.g. the priority of replenishment tasks to fill a pick slot which has insufficient inventory to meet current demand that is very high), and a worker's proximity to the task.

A WMS solution's ability to manage all these tasks and assignments is fundamental to its value. Better WMS solutions will provide a robust task management console where supervisors can see active task assignments and the queue of awaiting assignments and make adjustments as needed, such as manually increasing the priority of a given task.

3PL (Third-Party Logistics) Billing System

A software application that captures billable services by a third-party logistics company, such storage fees, pallet handling activities and more. It then applies contractual rates to those services, and either sends invoices directly to the 3PL's clients or sends the charges to the 3PL's accounting system.

If the billing system and the WMS are from the same vendor, the billable services should be automatically captured without any need for integration. In some cases, non-3PLs find value in a billing system if they need to charge separate company business units in a shared services environment.

Unit of Measure

The different ways individual SKUs or groups of SKUs are tracked and processed (e.g., picked) in terms of handling unit. In most DCs, this can include pallets, cases, layers, inner packs, and eaches. Other units of measure can include: weight, length (e.g., for cables), tanks, Gaylord boxes, as well as others. There are differences in the capabilities to manage diverse units of measure across WMS vendors.

User Acceptance Testing (UAT)

A late-stage step in the WMS implementation process in which the adopting company tests the configured WMS across many scenarios and testing scripts. This usually requires several weeks to complete and is a critical step in achieving a successful go-live shortly after the UAT.

Value-Added Services

Additional services needed as part of inbound or outbound processing. This can cover a wide range of activities, from simple price ticketing to light assembly operations. The services are often required by specific customers. Based on receipt or customer order flags, a WMS should be able to direct items to inbound or outbound VAS processing areas and manage the execution of the services.

Vendor Managed Inventory

There are different versions of Vendor Managed Inventory (VMI) as part of the supply chain, but in WMS terms it is usually associated with a supplier owning the inventory in a customer's warehouse or DC until an event triggers a change. A classic example is a hard drive maker owning the inventory until a drive is inserted into a PC or laptop computer, which triggers a change in ownership from the drive maker to the computer manufacturer, and a corresponding invoice is created. There are some other permutations of this basic theme. The supplier is also generally responsible for maintaining adequate inventory levels at its customers' locations. Not all WMS solutions support this type of VMI.

Voice Technology

A system in which work is assigned to and completed by workers using their own voice and responses from the Voice system. For example, an associate with some form of mobile device and a headset is instructed by the WMS which location to go to for the next order pick. Once there, the worker generally speaks the check digit of the location barcode (a number at the end of a code, in human readable form) to verify he/she is in the right place. The Voice system will then tell the worker how many items to pick. After speaking “done” or a similar statement, the Voice system will direct the worker to the next task.

Voice technology is considered “hands-free” because it eliminates the scanning of locations and/or item barcodes. It is primarily used in order picking, especially piece picking, but can also be used for case picking, replenishment, confirming cartons leaving a sorter and much more. Most commonly, the WMS interfaces to a third-party Voice technology provider. However, some WMS vendors offer their own Voice solution.

Warehouse Control System (WCS)

A class of software generally focused on controlling material handling systems execution. For example, in a conveyorized sortation system, the WCS would execute the "induction" of a carton in the material handling system, mergers of cartons coming from different lines, tracking each carton and diverting it to the appropriate lane when leaving a sorter and more. This generally involves PLC programming which controls the machinery. Most of these functions are distinct from WMS functionality.

However, there are some areas, such as the routing of cartons through a series of pick modules, or automated label print-and-apply, where the control may come from either the WMS or WCS. In the past, this was largely a custom programming effort, but now many WCS offerings are available packaged and "out-of-the-box."

Warehouse Execution System (WMS)

A newer type of warehouse software that can work with a new WMS or as an add-on to an existing WMS. There is no widely accepted definition of WES, and available solutions in the marketplace vary widely in terms of capability and focus. That said, a WES can offer levels of order fulfillment orchestration and optimization beyond those available in a Tier 1 WMS solution.

Capabilities often include: granular real-time visibility to throughput and bottlenecks by area of the DC; advanced labor planning and allocation; order batch optimization; optimization of work assigned to automated and non-automated resources; the automatic release of work to the floor based on a variety of attributes (the “autonomous WMS”).

Warehouse Management System (WMS)

Software for managing and optimizing warehouse or distribution center performance. Core to WMS capabilities are the real-time visibility and control of inventory in the DC, generally through the use of barcode scanning, using some combination of scanners connected to desktop monitors or more commonly mobile wireless terminals. The WMS will manage processes for receiving, putaway, order pool management, picking, replenishment, packing, staging and truck loading. It will support other functions, such as inbound inspections, cycle counting, and value-added services or even light assembly operations. Also key to WMS performance is systems-directed task management.

Many WMS vendors offer additional modules such as labor and resource management, slotting optimization, yard management, Warehouse Execution Systems and more. Within the broad category of WMS providers, there are a wide range of capability levels, of which the market generally thinks of in terms of Tier 1, 2 and 3 solutions, with Tier 1 being the most advanced.

Wave Management

A process and WMS capability in which groups of orders from the overall order pool are selected for processing (order picking) based on attributes of the orders. For example, pick "waves" might be based on outbound carrier schedules, order priority, store groups in retail or many other variables.

In advanced Warehouse Management solutions, wave selection criteria can be pre-configured and automatically released based on a schedule. The WMS should also be able to trigger needed forward pick replenishments for the wave before it is released, and to balance work in creating the wave between different processing areas, such piece and case picking. There should also be flexibility in working across waves as needed, without needing to complete one wave before the next is released.

Waveless Picking

As the name suggests, this is a way of releasing picks to the floor without a wave management process. However, in limited capability WMS solutions, orders can only really be released in the sequence they are received. Today, however, the term "waveless picking" more commonly applies to a more advanced approach to piece picking in which picks are dynamically assigned to a picker based on many variables, such as pick location, order priority, opportunities to minimize travel distance and more. As just one example, a worker using a pick cart might have the picks to that cart dynamically assigned to the cart in real-time when the associate first scans the cart barcode. Later, a pick originally planned for that cart might by dynamically replaced with a newly received and higher priority order – a change that appears seamless to the operator. These processes are not available in a wave-based system. Note that in advanced WMS solutions, wave-based and waveless processes can operate in tandem.

Work Order Management

The processing of value-added services or even light assembly operations in the DC, either as part of the WMS or as an add-on module, allowing for the creation of planned jobs (work orders), and based on a bill of materials direct the movement of component inventories to the work order processing area. The packaging/assembly of the new goods will be directed, as well as inventories used or consumed as part of the process. More advanced capabilities include support for multi-level bills of material, full cost calculation (labor and materials, including direct and packaging materials), and the ability to factor-in an expected scrap rate.

Yard Management

A system, often available as a WMS add-on module that provides visibility into which trailers and related inventory are in the "yard." Based on WMS instructions, the movements of the trailers and other assets can be managed, moving to inbound (loaded containers) or outbound (empty) trailers to a dock door, often in a "drag-and-drop" fashion.

The YMS can also manage the entry and exit of trucks into and out of the yard. This is closely related to the concept of "dock door management."

Zone Management

A WMS capability in which groups of storage locations can be grouped together to allow more precise control of how they are used. The most common example is defining putaway zones, for example by velocity code (fast movers zone, medium movers zone, etc.). But a WMS may also support other types of zones, such as work zones, cycle counting zones, slotting zones, pick zones and more. An advanced WMS sill support “one to many” zone management – a given location can be included in multiple zone types.

Zone Picking

A piece-picking process in which groups of forward pick locations are grouped into zones, staffed with one or more pickers who remain in their zones. As picks for a zone are completed, the WMS either directs the picker to close the carton/tote if all picks are finished or pass the carton/tote to the next zone for additional picks. In manual pick areas, the cartons/totes are moved by pushing them using a basic roller conveyor.

Some zone picking processes are automated, with cartons/totes moving on motorized conveyors and transferred laterally into zones to the left or right if there are picks for that carton/tote in a given zone. In non-automated pick areas, a differentiating WMS capability is to be able to create zones dynamically, balancing out the work across all zones.

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