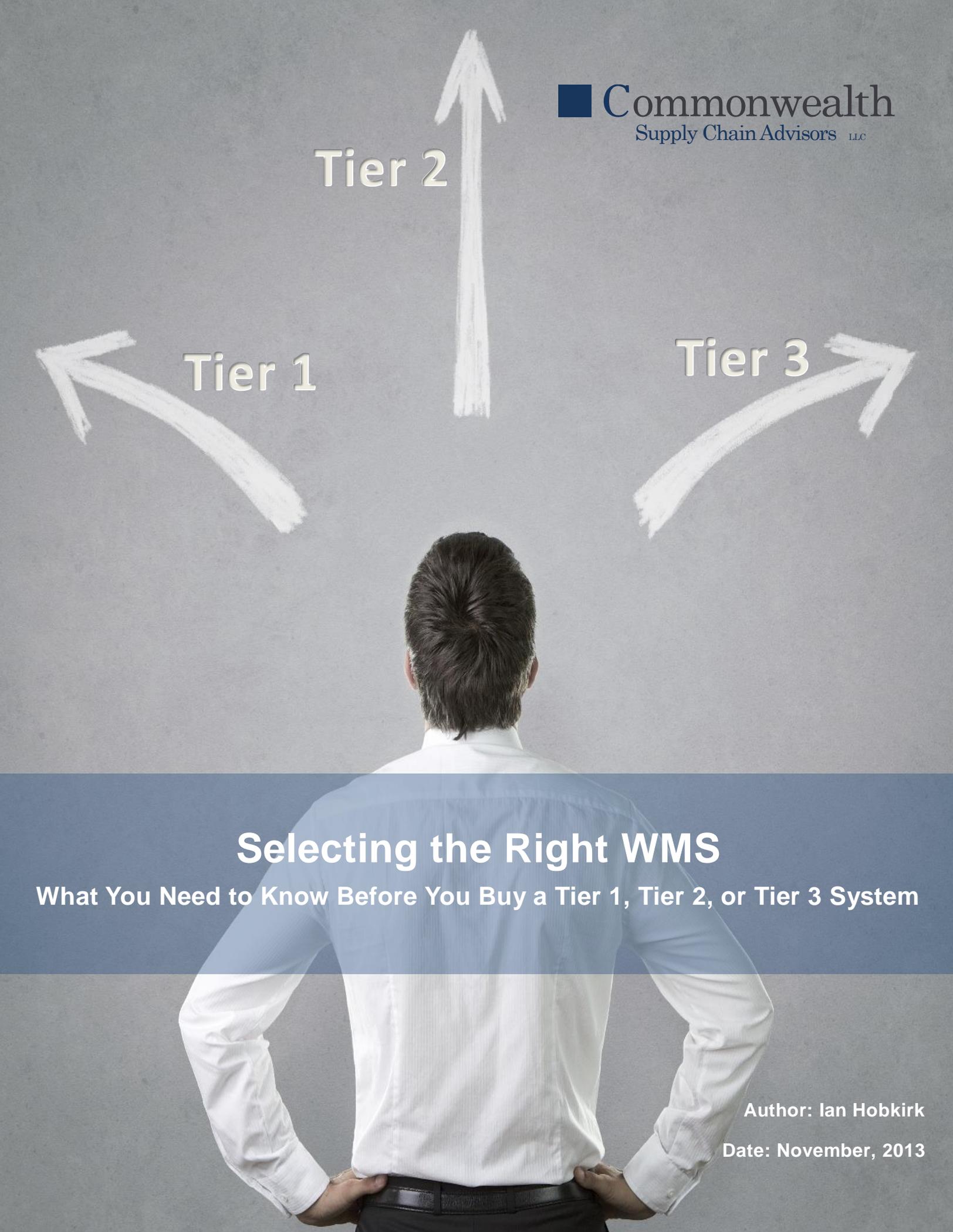


Tier 2

Tier 1

Tier 3



Selecting the Right WMS

What You Need to Know Before You Buy a Tier 1, Tier 2, or Tier 3 System

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Selecting the Right WMS

What You Need to Know Before You Buy a Tier 1, Tier 2, or Tier 3 System

Introduction

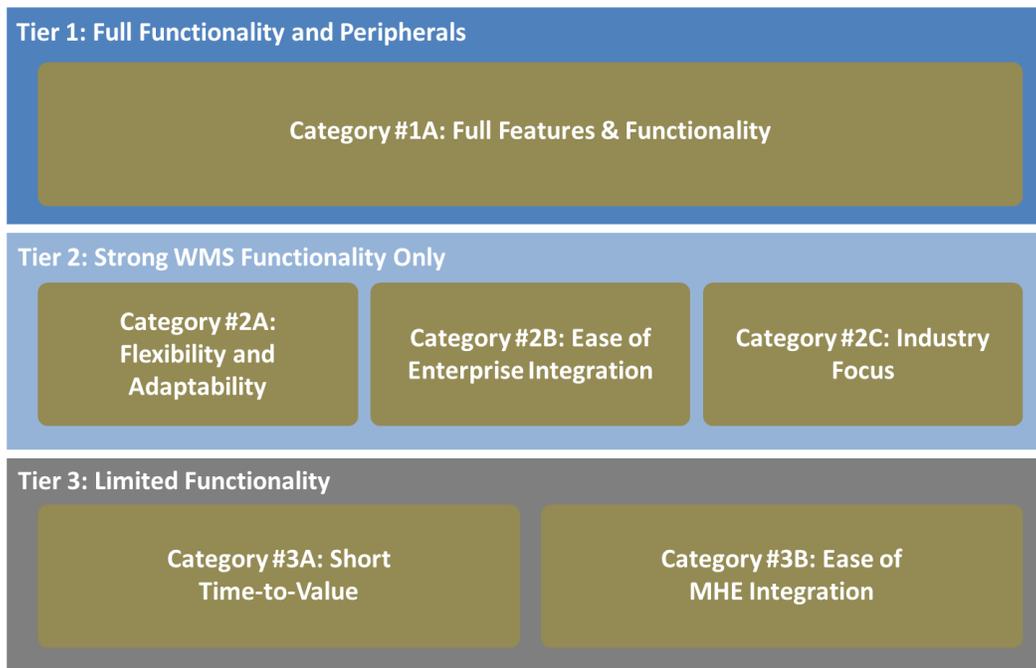
WMS: Three Tiers or Six Categories?

We always resist over-simplifications here at Commonwealth Supply Chain Advisors, and perhaps nothing is more over-simplified than the notion that it is possible to carve up the entire universe of one-hundred or more Warehouse Management Software (WMS) providers into three neat categories and calling them Tier 1, 2, and 3. The vendor landscape is infinitely more complex than that, and companies' reasons for choosing providers are multi-faceted and don't fit easily into just three buckets. Furthermore, the three-tier categorization ignores the ERP vs. Best-of-Breed religious debate, which rages on after more than two decades. For this reason, Commonwealth has always viewed the WMS provider landscape as being made up of six groups of vendors, each of which has their unique strengths and weaknesses.

However, we are also realists here at Commonwealth, and as such, we are forced to admit that the three-tier paradigm does reflect the way that most companies tend to think about software providers, even if it does ignore many of the important nuances amongst vendors.

So, for this report, we have taken our long-standing categorization method and blended it into a way of thinking about WMS providers that features the best of both the three-tier and the six-category model (Figure 1).

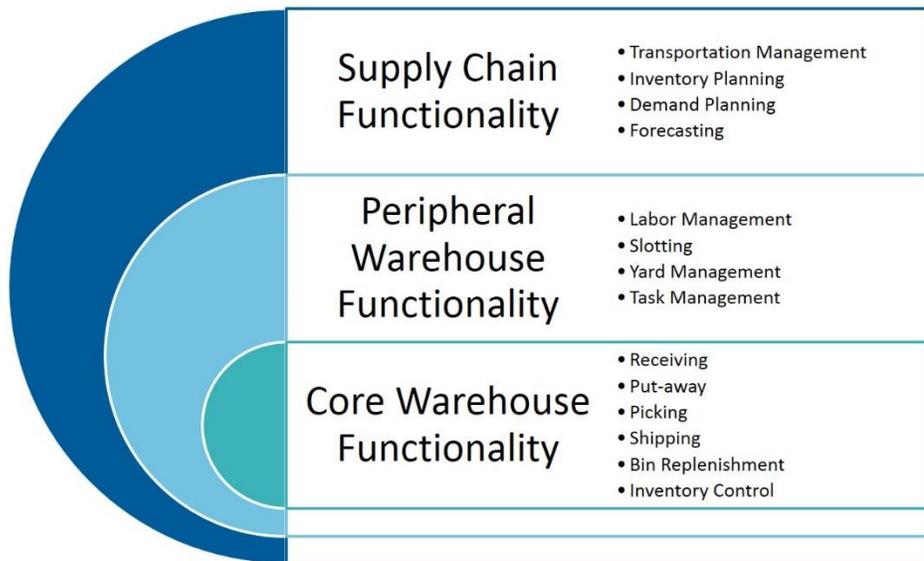
Figure 1: WMS Vendor Categorization



Definitions of the Three Tiers

This new model takes the six categories and assigns them one of the three major tiers in the more basic paradigm. The tiers in the basic paradigm are defined solely by the functionality offered by their vendors. Functionality levels start with core warehouse functionality, expand to include peripheral warehouse functionality, and finally broader supply chain functionality (Figure 2)

Figure 2: Expanding Functionality



Tier 1: Full Functionality & Peripherals:

Vendors in this group tend to share the following characteristics:

- Complete set of warehousing functionality.
- Complete warehousing peripheral functionality from native modules like slotting and labor management with seamless integration back to the core WMS.
- Full supply chain functionality: While not a requirement from a purely warehousing perspective, companies tend to associate Tier 1 WMS vendors with this additional supply chain functionality in areas such as transportation management, inventory planning, etc. It should be pointed out that even amongst Tier 1 vendors, these broader supply chain applications are usually not as tightly integrated with the WMS in the way that a slotting or LMS module might be.

Tier 2: Strong WMS Functionality Only

Vendors in this group tend to share the following characteristics:

- Complete or near-complete set of warehousing functionality. These mid-tier providers may have minor limitations in pure warehousing functionality compared with Tier 1 vendors.
- Lack of native modules in the peripheral warehousing areas like slotting and LMS. Often these Tier 2 providers have forged alliances with point solution providers to offer peripheral modules which are not natively developed.
- Lack of broader supply chain functionality such as transportation management and inventory planning. These mid-tier vendors usually do not offer these modules, and often do not have strong partnerships with other providers in these areas.

Tier 3: Limited Functionality

Vendors in this group tend to share the following characteristics:

- Significant limitations in more complex warehousing functionality compared to Tier 2 or Tier 1 vendors.
- Lack of native modules in peripheral areas like slotting and LMS. These Tier 3 vendors have also developed fewer partnerships and integrations with other providers in these areas.
- Lack of capabilities or partnerships for broader supply chain functionality.

The following sections will discuss each tier in detail, reviewing new developments in the vendor community, reasons to use vendors from each category, and reasons for caution.

Overview: Tier 1 Vendors

Changes to the Tier 1 Landscape

The last decade has seen significant changes in the Tier 1 landscape. In 2003, there were about a half-dozen software developers who could lay a credible claim being “Tier 1” WMS vendors. Today, that number stands at two (some analysts may argue three). The primary reason for this shift is that many of the former top-tier players were victims of acquisitions by companies that halted most product enhancements and merely maintained the legacy platforms.

As noted in the previous section, a distinguishing characteristic of these top-tier providers is their offering of broader supply chain applications such as transportation management, inventory planning, and demand planning. This trend was driven into high-gear by the 2012 merger of WMS provider RedPrairie with JDA Software, a provider of supply chain planning tools. When the merger was announced, Commonwealth Managing Director, Ian Hobkirk, had a chance to question JDA CEO Hamish Brewer in a press conference on the future of the two companies. As Commonwealth reported at the time, “Mr. Brewer said in no uncertain terms that the company plans to migrate as many applications as possible onto a common platform. Mr. Brewer described the company’s intention to offer a “best-of-suite” application with a manageable interface back to an ERP system...Commonwealth believes that RedPrairie should be able to present itself as a credible third option to the ERP vs. fragmented best-of-breed debate: a “super best-of-breed” that can manage the entire supply chain with a single interface back to the ERP.”

In the twelve months following the merger, Commonwealth has taken several informal surveys of companies which reveal that interest in the “super best-of-breed” concept is tepid thus far. Simply put, most companies don’t see the need (yet) to have the same company that provides their WMS also provide their demand planning and forecasting software. As companies continue to break down internal walls in their supply chain organizations, this feeling may change over time.

Reasons to Use Tier 1 Technology

Commonwealth believes that the primary reasons companies should choose Tier 1 WMS include:

Inbound Warehousing Complexity

Business process complexity is still the primary reason why companies should consider a Tier 1 WMS over other categories. While WMS systems across all tiers have made strong advances in developing features for outbound processes like picking, Tier 1 providers still lead the pack in inbound process capabilities, including:

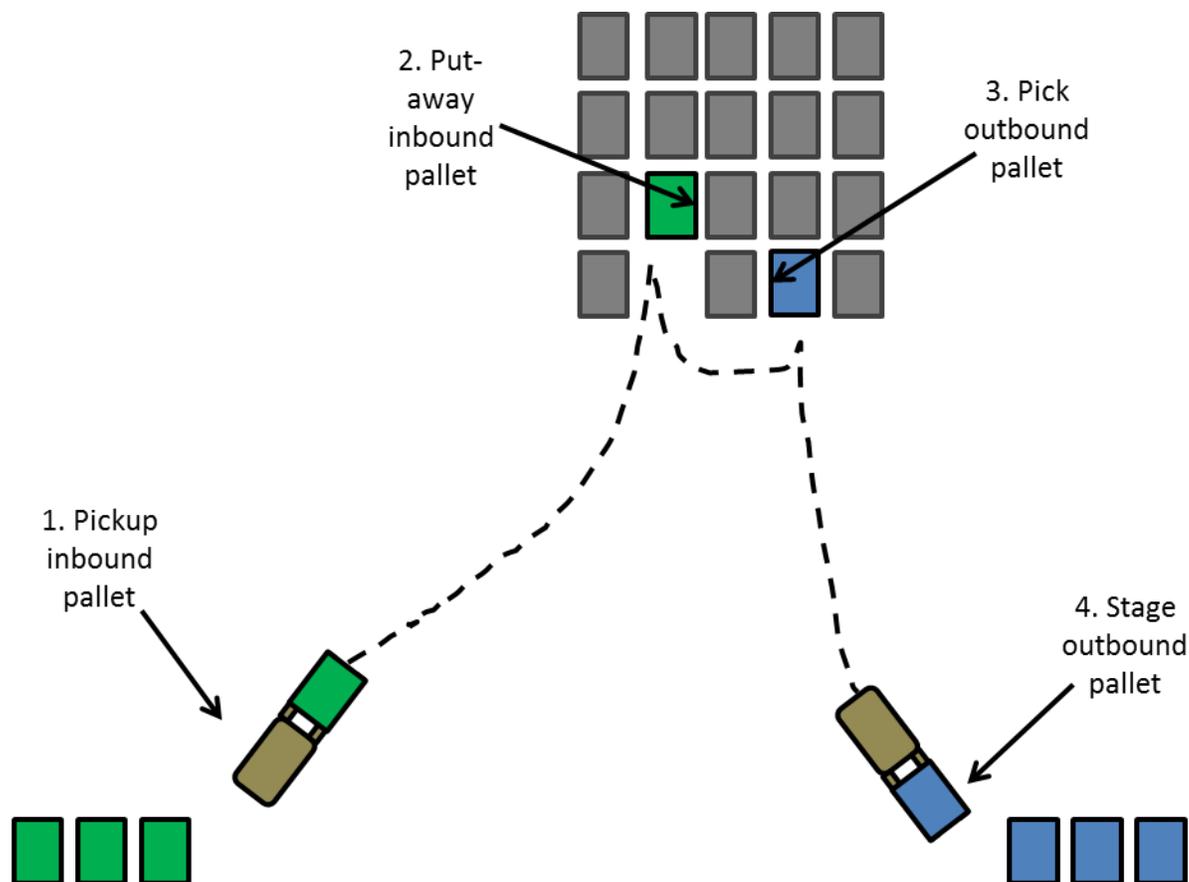
- Receiving staging by zone: at receiving, direct that inbound product be staged on a pre-defined movable unit based upon its destination zone.
- Put-away by movable unit: allow multiple SKUs to be placed on a license plated movable unit; allow the movable unit license plate to be scanned once at put-away, and direct put-away of all SKUs on that movable unit in a logical pick-path.
- Clustered put-away: allow multiple SKUs to be put away in the same trip through the warehouse in a logical pick path.

These three features are very important in an operation that receives small amounts of individual SKUs and must put away multiple SKUs at the same time. Companies like this with large contingents of labor in receiving and put-away (20 or more) would do well to consider the benefits offered by increased efficiency in these areas. These features matter less in operations where full pallets of the same SKU are received and put-away.

Task Interleaving

Companies handling full pallets of goods at receiving, and who also frequently pick full pallets can see tremendous efficiency gains from inbound/outbound task interleaving. This functionality involves combined put-away/picking cycles - when a full pallet is put-away, the WMS searches for full pallet picks which need to occur in proximity to the put-away bin and places this pick as the next task in queue (Figure 3).

Figure 3: Task interleaving



The business case for task interleaving is similar to that for back-hauling in the transportation world: reduce the amount of empty vehicle travel. In Commonwealth’s experience, task interleaving is still primarily in the domain of Tier 1 WMS systems, due to the complexity of proximity-based task assignment.

Slotting and Labor Management

As noted previously, a distinguishing characteristic of Tier 1 WMS continues to be the fact that these providers have developed native, fully integrated slotting and labor management modules. It should be pointed out, however, that many Tier 2 providers are able to offer this same functionality by partnering with other software providers. This begs the question then, when does it make sense to have a fully integrated solution vs. a “best of breed” slotting or LMS system?

The truth is that not all companies require an integrated Tier 1 slotting system. Many companies have stable product lines and little seasonality. These businesses may certainly benefit from a large-scale, one-time re-slotting exercise, followed by minor rebalancing on an annual scale. This level of slotting does not require a fully integrated solution, but can often be satisfied with spreadsheet-based tools or other commercially available applications.

“How do I know if I need a Tier 1 slotting solution vs. a spreadsheet approach?”

However, some businesses have a high rate of new product introductions, short product lifecycles, and a large degree of seasonality. These industries can include consumer electronics, apparel, and certain aspects of housewares. For these companies, slotting must occur much more regularly – on a quarterly, monthly, or even more frequent basis. These businesses will benefit from a Tier 1 slotting solution. These systems have benefits over less sophisticated tools in that they can create slotting tasks and pass these directly to the WMS for execution. Additionally, when used in conjunction with labor management, a Tier 1 system can evaluate the potential labor savings from re-slotting a SKU against the time it will take to perform the re-slotting. A sophisticated, prioritized list can be developed which shows

the most important moves to make, and also includes pre-requisite move chains (example: first move SKU A to make room for SKU B). Only fully integrated solutions can offer this level of complexity. Companies with large labor forces as well as volatile demand patterns should consider Tier 1 WMS providers for these reasons.

How do I know if I need a full-featured Labor Management System?"

Labor Management Systems similarly have various levels of capability, with not all companies requiring a full-featured, Tier 1 system. Companies with a high level of uniformity in picking processes may find that simple historical averages or “reasonable expectations” are enough to set a credible performance standard. Other companies may have invested heavily in goods-to-picker automation which makes the human labor component a smaller portion of the overall cost of distribution; these companies also may have diminished need for a sophisticated labor management system.

However, many operations feature numerous different types of picking – piece picking, case picking, pallet picking, etc. In these situations, fully engineered labor standards are often the best way to develop a real performance standard that takes into account factors such as travel distance, transaction time, and other variables. Additionally, processes such as receiving, put-away, and shipping have so much inherent variability in each task that it can be challenging to use any generalized averages to set a performance bar for individuals. Labor management software using engineered labor standards fills this need by calculating a precise amount of time it should take to complete each task using a library of master standard data. There are very strong independent software providers that offer Labor Management Software; it is also offered by both of the acknowledged Tier 1 WMS developers.

The value of Labor Management Software that is fully integrated with a WMS is that reporting and visibility into performance can be more real time. Tasks are created in the WMS, the LMS calculates a standard for them, and the WMS tracks the worker’s performance to that standard, all in real time across an interface maintained by a single software provider.

Companies that should consider a Tier 1 Labor Management Software System are ones with operations that rely on vehicle-based picking, conveyor-based picking (to a lesser extent), and that have high levels of process variability in the operation. As with most WMS-related business models, it also helps to have a lot of labor in the distribution center to begin with, so that the savings can more easily justify the cost of technology.

Multi-Site Distribution

Companies that plan to deploy their WMS solution at multiple sites in a short period of time may feel that the larger pool of resources available with a Tier 1 provider will be valuable. This can certainly be true in many instances. Some Tier 1 providers have very mature partner ecosystems which they can draw on to support a large-scale deployment. These partners have developers that are trained and certified on the specific WMS system and can add vital man-power on complex implementations. Smaller WMS providers may not have this network, or it may not be as experienced in WMS work.

It should be pointed out that some Tier 2 providers also have large teams of resources available, especially those companies that fall into the ERP software space.

Global Requirements

Most mid-tier providers in the United States only offer English and Spanish language support, while in many cases, Tier 1 providers support a larger selection of global languages. This will be important for companies that wish to deploy the WMS globally.

Reasons to be Cautious About Tier 1 Technology

It should be noted that while in some cases there is safety in numbers, as noted above, size alone is by no means a guarantee of a good fit with a WMS provider. There are several reasons for caution when considering Tier 1 WMS developers:

Lack of Responsiveness

The proverbial analogy of the small fish in the big pond often holds true in the WMS world. The WMS world is very project-oriented, and even the largest of companies can be spread thin at times if too many projects come in their door at the same time. When this happens, it can be difficult for smaller customers to get the attention they require when companies many times their size are competing for the same resources. Additionally, the perception of “safety in numbers” can evaporate quickly if most of the developers assigned to a project are inexperienced. Sadly, Commonwealth has seen this scenario play out on occasion, with smaller user-companies failing to have their projects staffed with the right quantity and quality of resources.

Integration Doesn't Live up to Expectations

A Tier 1 provider's broader assortment of applications such as Transportation Management, Inventory Management, and Order Management applications can often seem impressive, as can the prospect of having a single software provider supporting all of a company's supply chain applications. Many companies choose this path in the hopes that IT integration will be simpler as well.

Caution should be exercised here, however. Many Tier 1 providers have grown through acquisition, and have a potpourri of applications with different code bases that may be poorly integrated. Additionally, just because a provider has a best-in-class WMS system does not imply that other supply chain applications in the suite are as functional or mature. Commonwealth has witnessed instances where a Tier 1 WMS deployment was successful, but the overall project struggled due to less mature peripheral applications.

The best way to guard against this situation is to fully vet any additional supply chain applications which are being considered in the same thorough manner in which the WMS was evaluated. Never assume that all of a software provider's offerings are equal in terms of functionality or maturity.

Costs Can Add Up

One of the primary reasons that some companies don't use Tier 1 providers is that they can be cost-prohibitive in some instances. As the next section will discuss, Tier 2 providers have caught up to Tier 1 providers in a number of functionality areas. If there are no glaring functional gaps in a Tier 2 provider's offering, many companies are not willing to pay the premium required by a top tier WMS developer.

Commonwealth has observed that Tier 1 providers can, on certain occasions, be very price-competitive with their mid-tier rivals. While this is not consistently true, certain factors which can drive the price point of a Tier 1 provider down include:

- If the purchasing company is large and there is potential for future implementations
- If the purchasing company is managing a thorough competitive bidding process that includes mid-tier providers
- Leveraging the calendar: closing the deal at the end of the month or quarter

Overview: Tier 2 Vendors

Changes to Tier 2 Landscape

As discussed in the introduction, there are three primary categories of providers who make up the group of "Tier 2" vendors, each of which has gone through changes in recent years:

- 1A: Flexibility and Adaptability: Over the last few years, many of these providers have utilized Service-Oriented Architecture (SOA) to make their systems highly configurable by users. This means that even if a mid-tier provider does not have a particular feature "off the shelf", users can develop it without having to perform source-code modifications. This is a very attractive proposition to many companies that have strong internal IT departments who can perform this configuration.
- 1B: Ease of Enterprise Integration: Both of the major ERP providers (SAP, Oracle) have made major new releases of their WMS modules in the last five years. Both of these are the result of ambitious development roadmaps, and both are significant improvements over the previous offerings in Commonwealth's opinion.
- 1C: Industry Focus: Certain providers continue to have strong focus in particular industries, with the primary ones being third-party logistics providers and retail.

In general, one of the biggest changes that has been evident in the Tier 2 space over the last decade is the general improvement in core warehouse functionality. In the past, significant functionality trade-offs had to be made in exchange for the lower cost of a Tier 2 system. Today, these trade-offs are less painful. Commonwealth recently surveyed a group of Tier 2 and Tier 3 providers to assess their capabilities, and we were pleasantly surprised to find that, in general, this group has elevated their level of performance.

Commonwealth created a list of 25 functionality points which have traditionally been challenging for mid-tier WMS providers to address (the vendors responded on the condition that they not be identified by name). We asked each vendor to indicate whether this functionality was:

- Standard Functionality
- Configurable Functionality

- Customization Required
- Not Available Currently

We also asked about actual usage amongst their client base. Was the functionality:

- Currently in-use with referenceable clients
- Available but not currently in use
- Not available

Based on the vendors' responses to our questions, Commonwealth devised a rating system for each functionality area as follows:

- Generally available
 - The feature is generally available with minimal customization required
 - In use by, at least, some referenceable companies
- Selectively available
 - The feature is available but often with some customization required
 - Might not be currently in use by any companies
- Generally not available
 - If the feature is available at all, customization is required
 - Might not be currently in use by any companies

Commonwealth's assessment of the availability of functionality is general in nature. There may be other vendors in Tier 2 or Tier 3 categories which were not surveyed by Commonwealth which may offer the functionality in question. However, the findings from this research were very insightful.

Reasons to Use Tier 2 Technology

More Responsiveness

Another reason that Tier 2 WMS providers are worth considering is that they may be more attentive to the needs of small and mid-sized customers. A significant portion of their revenue may come from dealing with smaller clients, and they may have tailored their sales cycles to be better attuned to smaller enterprises. Ideally, a Tier 2 vendor should be "big enough to get it right, small enough to care" (See Commonwealth's blog: [Vendor Selection: Big Enough to get it Right, Small Enough to Care](#)). The responsiveness and service levels demonstrated by the vendor during the sales process are often a good indicator of responsiveness during implementation.

Lower Cost

Cost continues to be a key reason why many companies choose a mid-tier provider. WMS systems are often cost-justified by labor savings, and in smaller operations with less labor to save, the company can afford to spend less capital on the cost of enabling technology. Commonwealth, of course, advises that any cost-based decisions be made after a full evaluation as to whether the less expensive provider has the functionality.

Below is a list of the top functional areas which have been significantly enhanced by mid-tier providers over the last ten years:

More Generally Available Functionality

Cluster Picking

- **Definition:** Pick multiple orders at the same time and put them in discrete containers by order.
- **Why it matters:** Transitioning to cluster picking is one of the single largest one-time gains in productivity that a distribution center can experience. Instead of making six trips through the distribution center, the same six orders can be picked in a single trip with the entire process directed by the WMS. Bar-code scans ensure accuracy by confirming the pick and the put.

Two-Tier Bin System

- **Definition:** The same SKU can exist in two different bins in the distribution center.
- **Why it matters:** Utilizing a forward pick area can be a huge boost to productivity in operations that utilize piece and case picking. A large number of SKUs can be represented in a relatively small area of the distribution center, greatly reducing walking in the pick process.

SKU Mirroring

- **Definition:** The same SKU can exist in two different bins in the same ZONE.
- **Why it matters:** In some operations that have a few very fast moving SKUs, it is important to represent these in two or three different locations within a zone to avoid congestion as multiple pickers need the same item for their order. This capability can also be important in order to improve the replenishment process. Some operations practice dynamic bin assignment, where a certain number of bin locations are intentionally held open. Newly replenished product is placed in these open bins, even while the remaining supply of that item is still being picked out of the original bin. Once the original bin is picked down to zero, it is released into the pool of available bins. It should be pointed out that this capability is still a weakness in certain legacy WMS systems which could be classified as Tier 2.

Pick Restriction

- **Definition:** The system can limit picking only to bins designated as "forward pick bins."
- **Why it matters:** Selective use of this functionality allows rules to be setup which allow small orders to be picked from a forward pick bin, but larger orders to be picked from overstock in order to avoid completely depleting the supply in forward pick.

Min/Max Replenishment

- **Definition:** Replenish to a bin if the quantity falls below a pre-set minimum level.
- **Why it matters:** This functionality is key to properly stocking a forward pick area and avoiding visually inspecting bins prior to replenishment.

Cycle Counting

- **Definition:** Counting portions of the inventory each day to ensure bin and item-level accuracy.
- **Why it matters:** Cycle counting is the primary method in use today for maintaining accurate bin-level inventory and avoiding a disruptive physical inventory.

Advanced Attribute Tracking

- **Definition:**
 - Track product by lot #
 - Pick product by lot #
 - Track serial numbers
 - Track country of origin
- **Why it matters:** Certain industries such as food & beverage and life sciences are required by law to track lot and serial numbers in the event of a recall. Additionally, certain hi-tech industries are becoming increasingly concerned with tracking country-of-origin for components parts, especially if multiple suppliers provide the same SKU.

More Selectively Available Functionality:

The functionality listed below is only available from certain mid-tier WMS providers:

Tandem Picking

- **Definition:** Pick multiple orders at the same time using tandem vehicles such as double/triple-length pallet jacks and "tugger" vehicles.
- **Why it matters:** This functionality can significantly boost pick rates for high-cube products or case picking. Industries which use this form of picking include grocery distribution and hardware distribution. Some WMS systems are not able to perform case picks for two orders at the same time.

Put-Away by Movable Unit

- **Definition:** Allow multiple SKUs to be placed on a license plated movable unit; allow the movable unit license plate to be scanned once at put-away, and direct put-away of all SKUs on that movable unit in a logical pick-path.
- **Why it matters:** This functionality allows reduced travel during put-away.

Clustered Put-Away

- **Definition:** Allow multiple SKUs to be put away in the same trip through the warehouse in a logical pick path.

For a more thorough review of the various pick methodologies described in this paper, read ["What to Expect from a Mid-Tier WMS"](#)

- **Why it matters:** Like cluster picking, this functionality allows multiple SKUs to be put away on a single trip through the distribution center, significantly reducing travel.

Dynamic Label Application

- Definition: Apply a retail-compliant (or other) label to cases at time of picking with scan confirmation.
- **Why it matters:** This functionality dramatically reduces the amount of time spent on downstream labeling of product after the pick is made. It also decreases the likelihood of error as the label is applied as soon as the item is identified initially.

Cartonization

- Definition: Determine the optimal size shipping container based on the cube and longest dimension of the items which are to be picked for an order.
- **Why it matters:** This functionality allows small items to be picked directly to the shipping container, eliminating the need for downstream labor to re-pack product.

Large Quantity Override

- Definition: If a single pick exceeds x quantity and will drastically deplete the forward pick area, the system will direct the pick to be made from the overstock bin.
- **Why it matters:** This functionality reduces the amount of replenishment labor in many instances.

Basic Productivity Tracking

- Definition: Track lines picked per hour by worker regardless of pick type.
- **Why it matters:** This functionality allows very basic labor standards to be set, and is useful in operations where there are high levels of process uniformity.

Advanced Productivity Tracking

- Definition: Track lines picked per hour by worker by pick type (i.e. distinguish between piece picks, case picks, pallet picks).
- **Why it matters:** This functionality allows more complex labor standards to be set.

Reasons to be Cautious About Tier 2 Technology

Technology Gaps

While great strides have been made in terms of features and functionality by Tier 2 vendors, there are still some key gaps which exist. The following features were categorized as “Generally Unavailable Functionality” for mid-tier WMS in Commonwealth’s recent survey.

Receiving Staging by Zone

- Definition: At receiving, direct that inbound product be staged on a pre-defined movable unit based upon its destination zone.
- **Why it matters:** This prepares the product for clustered put-away and makes a secondary staging step between receiving and put-away unnecessary.

Palletization

- Definition: Prior to case picking, determine the number of cases to be picked to each pallet based on cube.
- **Why it matters:** This functionality allows for improved picking planning and sets the stage for pre-shipping. It also allows for more cube-efficient pallets to be built, reducing shipping costs.

Pre-Shipping

- **Definition:** Calculate weight and quantity of all the multi-SKU pallets on an order before picking.
- **Why it matters:** Companies making shipments to large retailers must often pick an order, stage it in their dock area, and then notify the retailer of the quantity and weight of pallets on the order. The retailer then routes the order, and it may sit on the supplier’s shipping dock for several days, taking up valuable space. Pre-shipping allows the order to be virtually built prior to picking so that the retailer can begin the routing process early. The order is picked closer to the actual time of pickup, alleviating shipping dock congestion.

Weight-Based Accuracy Confirmation

- Definition: Weigh a carton or a pallet and compare it to a database of the actual weights - verify if the carton or pallet is within tolerance.

- **Why it matters:** This functionality improves pick accuracy and also helps enable pre-shipping.

Demand-Based Replenishment

- **Definition:** Proactively replenish to a bin if known demand for the item will exceed the quantity in the bin, EVEN IF the bin is not currently below its minimum stocking level.
- **Why it matters:** This functionality helps to prevent stock-outs in forward pick. Order turn-around times are reduced, and replenishment transactions can be planned and clustered, rather than being random and ad-hoc.

Task Interleaving

- **Definition:** Combined put-away/picking cycles - when full pallet is put-away, search for full pallet picks which need to occur in proximity to the put-away bin and place this pick as the next task in queue.
- **Why it matters:** This functionality greatly reduces labor costs in pallet handling operations, as it effectively doubles the amount of work which can be accomplished in pallet put-away cycle.

Acquisition Danger

Over the last fifteen years, a number of WMS providers – some very large – have been acquired by other software firms. It is the opinion of Commonwealth Supply Chain Advisors that, with few exceptions, those acquisitions have resulted in a decline in the quality of service to the customers of those companies. In many cases, the acquiring company has effectively ceased enhancing the acquired platform, while still providing some level of support for current customers. In most instances, the acquiring company has invested future research and development dollars either in its own native platforms, or has attempted to fuse together the acquired technology into yet another new product. This should not imply that this will be the case with all acquisitions, but historically, this trend has existed in the WMS sector.

As the RedPrairie/JDA merger in 2012 showed, companies of any size can be targets of an acquisition, so this cautionary advice should not be limited to Tier 2 providers. However, Commonwealth believes that companies in this tier may be most vulnerable to an acquisition. They are large enough to have a strong maintenance revenue stream, but small enough to be an affordable investment to a range of purchasers.

It can be difficult to anticipate a potential acquisition, but the best defense in this case may be a good offensive line of questioning during the WMS selection process to try to determine if the company is up for sale or trying to merge with another firm.

Partner Issues

Another reason for caution with Tier 2 providers lies in the fact that their implementation partner network is often less mature than those of their counterparts. A large portion of the “Tier 2” consists of ERP providers with WMS modules. Many of these companies – including the largest ERP providers – have implementation partners with strong experience in ERP deployments, but little or no experience implementing WMS. This sets up a dangerous situation where the implementer is naïve to the complexities of the distribution center, and fails to properly account for all of the required business processes when configuring the system. As Commonwealth has noted in previous reports, WMS implementation projects can arguably be more challenging than ERP deployments due to the range of process complexity and the low experience levels with technology amongst the users of the system. Companies considering using a 3rd party implementer should thoroughly explore that company’s experience specific to WMS implementations in order to avoid unpleasant surprises in this area.

Figure 4: Mid-Tier Functionality Matrix

Challenges	Strategies	Tactics	Enabling Technology	Level of support from Mid-Tier WMS	
Reduce labor costs	Pick more efficiently	Cluster picking - pick multiple orders at the same time and put them in discrete containers by order	WMS	3	
		"Tandem" picking - when case picking, two different orders can be picked at the same time utilizing a double-length electric pallet jack	WMS Double-length electric pallet jacks Tugger vehicles	2 n/a n/a	
		Put-away more efficiently	Receiving staging by zone - at receiving, direct that inbound product be staged on a pre-defined movable units based upon it's destination zone	WMS	1
			Clustered put-away - allow multiple SKUs to be put away in the same trip through the warehouse in a logical pick path	WMS	2
	Put-away by movable unit - allow multiple SKUs to be placed on a license plated movable unit; allow the movable unit license plate to be scanned once at put-away, and direct put-away of all SKUs on that movable unit in a logical pick-path		WMS	2	
	Pack and ship more efficiently	Implement specialized packing process	Process change	n/a	
		Pre-manifesting - Calculate weight and quantity of all the multi-SKU pallets on an order before picking	WMS	3	
		Dynamic label application: Apply a retail-compliant label to cases at time of picking with scan confirmation	WMS	2	
		Cartonization - determine the optimal size shipping container based on the cube and longest dimension of the items which are to be picked for an order	WMS	2	
		Palletization - prior to case picking, determine the number of cases to be picked to each pallet based on cube	WMS	1	
		Seal cases more quickly	Tape dispensers Case sealer	n/a n/a	
		Weight-based accuracy confirmation - weight a carton or a pallet and compare it to a database of the actual weights - verify if the carton or pallet is within tolerance	WMS	1	
		Reduce walking	Create a forward pick area		n/a
	Two-tier bin system - the same SKU can exist in two different bins in the distribution center		WMS	3	
	SKU Mirroring - the same SKU can exist in two different bins in the same ZONE		WMS	3	
	Pick restriction - the system can limit picking only to bins designated as "forward pick bins"		WMS	3	
	Large quantity override - if a single pick exceed x quantity and will drastically deplete the forward pick area, the system will direct the pick to be made from the overstock bin		WMS	2	
	Min/max replenishment - replenish to a bin if the quantity falls below a pre-set minimum level		WMS	3	
	Demand-based replenishment - proactively replenish to a bin if known demand for the item will exceed the quantity in the bin, EVEN IF the bin is not currently below it's minimum stocking level		WMS	1	
	Slot the warehouse more effectively		Slotting software Slotting spreadsheet	n/a n/a	
	Improve labor productivity	Basic Productivity Tracking: Track lines picked per hour by worker regardless of pick type	WMS	2	
			Labor management software	n/a	
		Advanced Productivity Tracking: Track lines picked per hour by worker by pick type (i.e. distinguish between piece picks, case picks, pallet picks)	WMS	2	
			Labor management software	n/a	
	Task interleaving - combined put-away/picking cycles - when full pallet is put-away, search for full pallet picks which need to occur in proximity to the put-away bin and place this pick as the next task in queue	WMS	1		
		Labor management software	n/a		
	Accuracy is poor	Improve accuracy	Pick confirmation - confirm that the correct product was picked based on a bar-code scan of the item or bin	WMS	3
			Cycle counting - allow incremental cycle counting in lieu of physical inventory	WMS	3
Track product by lot #			WMS	3	
Pick product by lot #			WMS	3	
Track serial numbers			WMS	3	
Track country of origin			WMS	3	
The DC is out of space	Improve space utilization	Improve storage density	Push back rack	n/a	
			Double deep rack	n/a	
			Very narrow aisle (VNA) storage	n/a	
			Mobile storage rack	n/a	

Overview: Tier 3 Vendors

Changes to the Tier 3 Landscape

Tier 3 WMS providers can be divided into two basic technological categories: the traditional, on-premise model and the newer Software-as-a-Service (SaaS) model. Since cloud-based WMS systems first appeared around seven years ago, there have been no shortage of opinions proffered on the pros and cons of the SaaS model for Warehouse Management Software. Regardless of where one stands on the debate, a few things can be said with certainty now that we are this far along the development journey.

When the first SaaS—based WMS systems were developed, many predicted that they would fundamentally transform the WMS landscape in the way that cloud technology changed transportation management. This did NOT happen, and for some good reasons. To begin with, transportation execution management has infinitely less process complexity than warehouse management. In the transportation world, loads are tendered and accepted based on standard EDI transactions with basic data fields like zip codes, weight, and NMFC classifications which can mathematically describe a load consistently from one business to the next. Warehousing is much more variable, with each distribution center having a certain number of unique or near-unique business requirements. Hence, it's not as easy to develop a single instance of software and have many, many companies using it in the same way.

Secondly, the SaaS model worked so well in the transportation world because of the significant requirement for business-to-business collaboration. Shippers must communicate specific information with a large network of carriers. Once the TMS system is configured to communicate with carrier x, then any others shippers that use the platform have the instant ability to also communicate with that carrier, without needing to repeat the EDI integration. This is a huge value proposition for TMS, but there is no corresponding need for B2B collaboration in the warehousing world. As a result, the basic elements that made the cloud such a win/win in the transportation world don't make the same technology a home run in the warehousing world.

That said, SaaS-based WMS has certainly caught on. There are several companies that offer SaaS WMS exclusively, and each claims to be doing a healthy volume of business (it should be pointed out that Commonwealth has not actually participated in a SaaS WMS implementation to date; much of our information is based upon data gathered during evaluations for clients). Additionally, some Tier 1 and Tier 2 providers now offer SaaS-based WMS as an alternative to their on-premise products, although none of these companies appears to be heavily promoting the cloud-based solutions. SaaS for WMS basically works, and many of the vendors in this space have bona-fide WMS experts on staff with years of experience in this technology.

Not to be ignored in the Tier 3 world are the numerous on-premise providers who continue to survive providing low-cost WMS solutions to a variety of different company types. Commonwealth tracks nearly 100 total WMS vendors, most of whom fall into the Tier 3 category. There is a wide spectrum of capabilities and pricing within this large group.

This report focuses on the growing SaaS contingent within the Tier 3 WMS world. Commonwealth has had a busy year with WMS selection projects, and it's given us a good chance to take a real look under the hood at SaaS WMS and evaluate its strengths and weaknesses.

Before stating Commonwealth's conclusions, we should point out that this information is based on a limited number of projects, and did not involve input from every SaaS WMS provider in the marketplace. Additionally, the information is based on quotations and sales-related statements, some of which may not be borne out by facts during implementation. But, even given these caveats, we felt that some interesting conclusions emerged which are worth sharing.

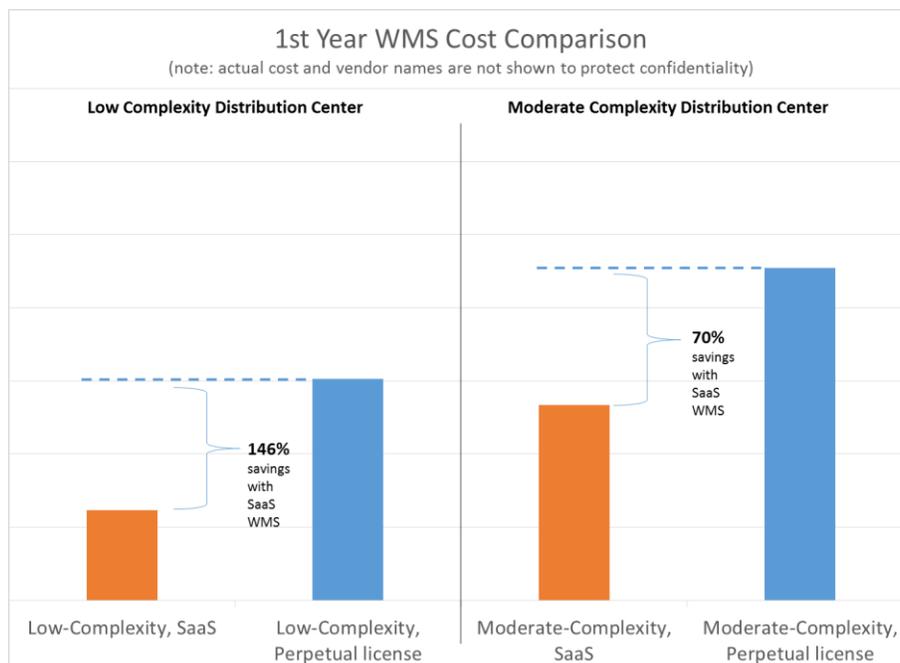
Reasons to Use Tier 3 Technology

Low Initial Cost of Ownership

Cloud-based WMS costs less on average in the initial few years of ownership. One of the major advantages touted by cloud-based WMS providers is the cost compared to the perpetual license model. In all of our WMS selections this year, cloud-based WMS was, on average, less expensive to own in the first year than traditional providers, sometimes by a very wide margin. Figure 5 below shows the relative cost difference in between on-premise and SaaS-based WMS for software and professional services (we averaged all of the prices together and removed the data labels from the axis to protect the confidentiality of individual bidders).

In certain select instances, lower-tier on-premise WMS providers can cost less than cloud-based WMS providers. In three out of the fifteen price-points we had for comparison, the perpetual license/on-premise model was less expensive than the SaaS model, but all three instances involved Tier 2 or Tier 3 providers.

Figure 5: 1st Year WMS Cost Comparison



Speed of Implementation

Commonwealth is reluctant to comment on implementation speeds due to our lack of first-hand experience with a SaaS deployment, but it is worth mentioning that a major selling point touted by SaaS providers is the much faster implementation time using this technology. Credible claims have been made of implementations ranging from ten to forty-five days, certainly much shorter than the six to twelve months of time required with an on-premise model. While Commonwealth has no reason to doubt these claims, as they are from very reputable sources, it seems likely that these examples are of very simple operations. The time required for configuration, testing, training, and conversion for even a moderately complex WMS project is usually measured in months, not days. Commonwealth plans to explore this topic further and provide updates to our readers.

Reasons to be Cautious about Tier 3 Technology

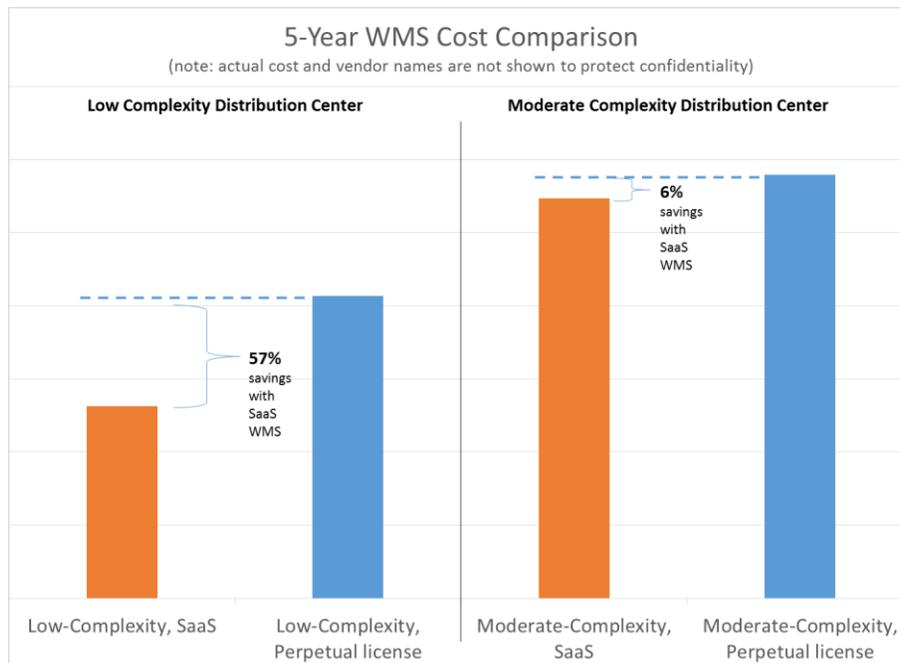
Long-Term Cost of Ownership

Commonwealth’s research shows that the cost advantage of cloud-based WMS drops off as operational complexity increases. In basic, simple operations where the WMS doesn’t require a lot of configuration, cloud-based WMS can cost about one-third of the price of its traditional counterparts. However, in even moderately complex operations, this cost differential narrows by about half, as the SaaS-WMS providers have to build in configuration time and cost to their up-front cost.

Cloud-based WMS is still cheaper in the long run in simple operations: When we calculated the five-year cost of ownership with both models, a simple operation that selects a cloud-based WMS still enjoys savings of 50% or more over a perpetual license model (Figure 6). Remember, a perpetual license model still requires users to pay 18 – 22% of the software cost each year in ongoing maintenance and support. This cost adds up and helps maintain the wide price differential even over time.

For more complex operations, the cost savings with cloud-based WMS almost vanish by the 5-year mark. In the projects we studied, the SaaS WMS providers’ ongoing costs were significantly higher than the maintenance and support on a traditional WMS, which erode most of the savings by year 5. Companies with complex operations will need to weigh the cash-flow benefits of SaaS against the higher long-term overall costs.

Figure 6: 5-Year WMS Cost Comparison



Ability to Customize

Some interesting facts emerged about how customization works in the world of the cloud. In many cases, we were impressed with the ability that the SaaS providers claimed they had to configure their software with switches and standard rules-based logic, without requiring source-code changes. By and large, we expect that upgrading to a newer version of the software with these configuration-level changes should be relatively painless.

However, the situation is not as cut-and-dry when it comes to actual source-code modifications. In our experience, most projects with a moderate level of complexity require at least some true source-code mods, even with top-tier providers. This becomes more challenging in the SaaS world, when all of the users are theoretically operating on the same code-base. If a SaaS WMS user requires source-code customization, then the WMS provider must change the code for all users, not just one. While the SaaS providers we spoke to all claimed that they were willing to modify their code as often and in as many ways as their users required, it seems reasonable that there must be some limits to this.

When we pushed some of the providers on this point, it seemed that there was the potential for the user having to negotiate with the provider to get these source-code changes made, and to make them on a timetable that met the user’s needs. Once the changes are made, then the other users must upgrade to the newest release, which could involve significant new sections of code, depending on how many users required customizations during a given period of time. Upgrades are not as easy as simply coming in to work one morning and discovering a bunch of new features on your software system, as can sometimes occur with less complex SaaS applications like CRM. The upgrade is usually an IT “event” involving testing and cutover which involves resources at the user company.

Furthermore, in order to keep all users on the same code base, the WMS providers usually mandate that these upgrades take place at certainly intervals, such as yearly. While it would seem that most providers offer some generous leeway on the timetable for upgrading, users are generally required to do these upgrades, whether they require newer functionality or not. Companies that are experiencing major reorganizations (such as going through a merger or acquisition) will need to discuss this situation with their SaaS provider up front to ensure that their integration timetable is not constrained by the SaaS developer’s schedule.

It seems clear that implementing a SaaS WMS in a low-complexity operation is a very different proposition than trying the same thing in a high-complexity DC. When complexity is low, there will be minimal instances where the user-company will have to negotiate with the WMS provider to get new functionality added to the code base. Additionally, when it’s time for the required upgrade, testing the new release and rolling it out is also less likely to be problematic. As the cost analysis shows, for these users, a SaaS WMS will probably cost less money to own, both in the short term and the long term.

However, for users with a higher level of operational complexity, it may prove difficult to utilize a highly customized instance of the software, and to perform forced upgrades annually. The initial cost savings with a cloud-based WMS may be offset quickly by the internal cost of continually rolling out new versions of the software. It should be pointed out, of course, that this rigorous upgrade schedule does force the user to always have a current version of the software with a modern technology platform. Many companies have fallen into the trap of postponing their upgrade for so long that they are left with an unsupportable version of software that costs as much to upgrade as to replace. So, a happy medium must be found when it comes to upgrading. The user-company should not feel compelled to conduct a complex IT event at a time when other larger enterprise projects don't make this feasible, but should still have a defined upgrade plan for their supply chain applications at a reasonable interval to remain current.

In Conclusion

The choice of which Tier, or Category of WMS provider to use should not be made lightly. Companies should carefully weigh factors such as functionality, cost, and sustainability when considering providers. Commonwealth Supply Chain Advisors has developed a very well-defined methodology for evaluating and selecting a WMS system. A thorough WMS selection process can take between three and six months, but is well worth it in the long run if the provider and user are a good match. (We've outlined a thorough and repeatable WMS selection process in, "[An Objective Guide to Selecting a WMS](#)")

Companies that successfully deploy WMS reap numerous benefits, including reduced labor costs, improved service levels, and greater visibility into inventory and workflow. Choosing the right WMS provider can be a catalyst to propel a company from average to best-in-class warehouse performance.

Resources on WMS Selection & Implementation

Additional Resources:

Whitepaper: [An Objective Guide to Selecting a WMS](#)

Whitepaper: [Six Tips to Avoid a Failed WMS Implementation](#)

Article: [Vendor Selection: Big Enough to Get it Right, Small Enough to Care](#)

Article: [What to Expect from a Mid-Tier WMS](#)

Article: [WMS Implementation Keys to Success](#)

About Commonwealth Supply Chain Advisors

Commonwealth is a leading supply chain consulting firm that helps companies of all sizes structure their supply chain networks, design distribution centers, and select and implement warehouse management systems (WMS). Commonwealth is based in Boston and works with clients across the globe. For more information, visit www.commonwealth-sca.com or contact Jennifer Thomas at (617) 948-2153.

About the Author



Ian Hobkirk

Mr. Hobkirk is the founder and Managing Director of Commonwealth Supply Chain Advisors. Over his 20-year career, he has helped hundreds of companies reduce their distribution labor costs, improve space utilization, and meet their customer service objectives. He has formed supply chain consulting organizations for two different systems integration firms, and managed the supply chain execution practice at The AberdeenGroup, a leading technology analyst firm. His career has provided him with a broad perspective on how to solve supply chain problems without automatically resorting to expensive technology. Mr. Hobkirk has authored dozens of white papers on supply chain topics, and his opinions have been featured in publications such as DC Velocity, Modern Materials Handling, and The Journal of Commerce.