How to Select the TMS, Provider and Solution Best Suited for Your Strategic Capabilities

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Initiatives: Technology and Solutions for Supply Chain and Operations

“Transportation management system” is a term used by many vendors offering widely different solutions for different user categories. Supply chain technology leaders can use this research to define the different types of TMSs, identify the type they need and identify a list of vendors for each type.

Overview

Key Challenges

- Choosing the right transportation management technology depends on a wide range of factors, including type of end user, scope of transportation, freight mode, region where the system will be implemented and shipper size (measured in freight spend).

- The term “transportation management system” (TMS) represents a plethora of different solutions, provided by different vendors for different business needs. Companies often struggle to compartmentalize technologies that offer specific solutions; therefore, it is easier to bundle all of these under one easy-to-use term.

- With so many options to choose from, companies increasingly fail to identify the right solution that aligns with their strategy and transportation processes. End users sometimes fail to identify whether the TMS they selected provides all functions needed to meet their requirements.

Recommendations

Supply chain technology leaders who are responsible for technology and solutions for supply chain and operations, and are seeking a suitable TMS solution for their company and their needs should:

- Select the right type of transportation management technology by defining the scope of their transportation needs. Use the definitions in this note as a guideline to identify the right type of TMS.

- Develop an understanding of the TMS landscape by learning what different solution options per mode, end user and region are available.
Create a plan to engage vendors that offer the solutions in line with their needs, by using this research to identify the vendors per category of TMS.

Introduction

TMS solutions are used by shippers (such as manufacturers, retailers, distributors and wholesalers), non-asset-based third-party logistics (3PL) organizations, brokers, digital freight vendors and asset-based trucking companies. Although they all use the term “TMS,” they all use the solution differently and for different purposes.

This note will provide better insight into the different types of TMS and how they align with the user category and the function or mode they focus on.

The multimodal TMS is the most adopted type of TMS and is focused on supporting for-hire transportation management operations. This is where users employ a variety of shipping modes, including over the road, private/dedicated fleet, parcel, rail and intermodal. Global companies and organizations that import products from different regions also use air and ocean as main transport modes. These can also be covered by some, but not all of the multimodal domestic TMS vendors (see Gartner’s Magic Quadrant for Transportation Management Systems).

Analysis

Technology is critical to the supply chain and especially so for logistics. Leading organizations can see many benefits by developing enabling capabilities, such as decision optimization, data and process visibility, and performance measures. These all help support a more comprehensive logistics strategy. This strategy can be widely different depending on the type of company using the technology and the region and mode of transportation.

Select the Right Type of TMS by Defining the Scope of Your Transportation Needs

Selecting the right technology, in this case a TMS, to support a company’s logistics strategy is a key component of the organization’s strategic capabilities (see Key Considerations for Supply Chain Leaders Evaluating Transportation Management Systems).

Trends in TMS

Several recent factors, however, are making that selection all the more challenging:

- TMS in multiple categories continues to see growth in global solutions for small and midsize users.
- TMS solutions are widely varied and change continuously. For example, the 12 types of TMS solutions mentioned in this note are each aligned with the needs of different end-user types, further complicating the buying decision for supply chain technology leaders.
- Multiple TMS vendors offer different types of transportation management solutions. Vendors and solutions should not be considered one and the same.
Different Needs for a TMS Solution

Gartner tracks multiple software application types that support the various needs of transportation operations (see Figure 1). These needs are based on carrier type (private versus dedicated versus for-hire), mode of transportation, type of movement, functional area in the transportation process, carrier networks, customer functionality, and technology and network partners.

■ Strong market growth — particularly, in the small and midsize business (SMB) segment and newer markets, such as Asia — is attracting new vendors to the market, creating confusion for supply chain technology leaders.

■ Complex and varied pricing models across TMS vendors further complicate the vendor selection for supply chain technology leaders.

■ As supply chain management applications mature, other factors, such as user experience, ease of implementation or cost of ownership, take on more importance and impact the selection of TMSs.

■ The TMS market has changed to mainly cloud-based solutions that have adopted emerging technologies to innovate their products further.

■ As more digital networks and platforms arise in transportation, TMS vendors continue to expand their capabilities and partner networks to mainly focus on visibility and capacity.

■ Multienterprise evolution — moving from an enterprise-centric view toward an extended enterprise network — has created different process requirements and the need for supportive technology (see Supply Chain Brief: The CSCO Perspective on Supply Chain Business Networks).
Different TMS Users and TMS Types

The term "TMS" is too often used for any solution that has something to do with planning transportation or the management of transportation. Gartner identifies multiple types of solutions that vary depending on users' needs; these solutions are commonly referred to as TMS (see Figure 2). Gartner research also focuses on specific TMSs. For example, the Magic Quadrant for Transportation Management Systems is focused on multimodal domestic TMSs for shippers and non-asset-based third-party logistics (3PL) providers. Multimodal international solutions are covered in the Market Guide for Global Trade Management Software. Parcel management solutions are covered in the Market Guide for Multicarrier Parcel Management Solutions and finally, fleet is covered as part of the Market Guide for Vehicle Routing and Scheduling.
### Overview of Different TMSs Based on User and Type

Gartner defines the different users as follows:

- **Shipper** — A shipper is a manufacturer, retailer, wholesaler or distributor that ships products from a supplier to its warehouse or manufacturing location, or ships products between its warehouse or plant locations, or to an end-customer location.

- **3PL provider** — A 3PL provider is a company that performs part or all of a corporation’s logistics function in an outsourced arrangement. Some part of logistics process management is involved in the service offering, such as those needed for warehousing and fulfillment, transportation management or international forwarding and customs.

- **Carrier** — A carrier owns and operates a network of physical assets, resources and staff to provide a transportation service over some segment of the supply chain. It could be a trucking firm, parcel shipping company, maritime shipping company, railroad or a cargo airline that conveys freight from an origin (for example, a supplier or factory) to a destination (for example, a distribution center) with its transportation assets. These companies make up the transportation industry. Their resources are

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**Figure 2. Overview of Different TMSs Based on User and Type**

<table>
<thead>
<tr>
<th>Type of Transportation Management System</th>
<th>Multimodal Domestic</th>
<th>Multimodal International</th>
<th>Parcel Management</th>
<th>Fleet</th>
<th>Carrier TMS</th>
<th>Brokerage</th>
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<td>Freight Forwarder</td>
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<td>NVOCC*</td>
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<tr>
<td>Air, Sea, Rail Carrier</td>
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Source: Gartner

*NVOCC = Non-Vessel Operating Common Carrier*
Learn What Different Solution Options Are Available to Better Comprehend the TMS Landscape

TMS offers an abundance of different solutions, provided by different vendors for different business needs. Companies often struggle to compartmentalize technologies that offer specific solutions; therefore, it is easier to bundle all of these under one easy-to-use category. Gartner has identified the following 12 categories and types of transportation management solutions.

No. 1: Multimodal Domestic TMS

Multimodal domestic TMSs are most often used by shippers (such as manufacturers, retailers, distributors and wholesalers) or non-asset-based 3PL providers for managing domestic transportation (mainly full truckload [FTL] and less than truckload [LTL]). The primary emphasis is on systems that support for-hire transportation management operations, where users engage a variety of shipping modes, including over-the-road, private/dedicated fleet, small package, rail, intermodal, air and ocean. At a minimum, shipper companies use TMSs to manage freight sourcing, planning, execution and settlement. Multiple subcomponents make up a comprehensive TMS throughout planning (for example, load consolidation, routing, mode selection and carrier selection) and execution (for example, tendering loads to carriers, shipment tracking and tracing, and freight audit and payment). This is the focus of Gartner's Magic Quadrant for Transportation Management Systems.

Sample Vendors: 3Gtms, 3T Logistics and Technology Group, Alpega Group, BlueRock Logistics, Blue Yonder, BluJay Solutions, E2open-Cloud Logistics, Manhattan Associates, MercuryGate, Oracle, RateLinx, SAP, Trimble

No. 2: Managed TMS Solutions

In addition to the TMS technology, managed TMS solution vendors also offer the resources needed to run the TMS daily. Managed TMSs offer the benefits of both traditional TMS technology, where the shipper controls all carrier contracts and how shipments are executed, and 3PL outsourcing, where daily available for hire or as dedicated fleets, usually for a corresponding transactional fee based on some type of rate.

- **Broker** — Although technically a third party to the relationship between shippers and carriers, transportation brokerage still closely resembles the carrier business. Transportation brokers are different from carriers: They do not own the assets or transport capacity that they sell access to. To buying customers, the broker acts as an optional carrier. To the actual carrier, the broker is a paying customer.

- **Freight forwarder** — A freight forwarder is a type of non-asset-based 3PL provider that specializes in air and ocean transportation activities for domestic shipments (usually scheduled, unscheduled and/or chartered air shipments) and international shipments (usually air or ocean shipments, but could be other modes). These shipments require specialized handling because of cross-border regulations (for example, classification, duties, filings and customs).
operations services are outsourced. These vendors are also included in the Gartner Magic Quadrant for Transportation Management Systems.

Sample Vendors: 3T Logistics and Technology Group, BluJay Solutions, C.H. Robinson-TMC, Transplace, Trimble

No. 3: Transportation Optimization Software

Complex and large-scale networks benefit from the use of advanced transportation optimization. Some large 3PLs might customize their entire TMS solution but buy the optimization software, which provides the engine for their solution. Other companies might use the optimization software for transportation network design and modeling. This allows users to consider additional variables related to facilities, fleets, products, workforce and customers when running extensive scenarios. These simulation capabilities enable deep insight into the operation and effectiveness of a company’s transportation network.

Sample Vendors: 4flow, Blue Yonder, flexis, LLamasoft, Manhattan Associates, Oracle

No. 4: Transportation Execution Systems

Transportation execution system (TES) solutions are focused mainly on the execution of transportation rather than the planning. These solutions also include procurement, freight payment and transportation analytics capabilities. This TMS model is most popular in Europe, where many shippers want to tender loads to a carrier and have the carriers deal with freight planning and optimization.

Sample Vendors: Pagero, Transporeon, Unifaun

No. 5: Multimodal International TMS

TMS multimodal international applications manage the planning and execution of multileg global shipments by ensuring processes are synchronized with all the parties involved in international transportation — mainly air and ocean. International shipments are typically complex, multileg movements, where goods and information flow among many constituencies across geographies. Solutions must support multiple modes of transportation with unique planning and execution requirements not usually addressed by a domestically oriented TMS. This functionality can also be found in certain global trade management systems, which can also manage import-export compliance and supply chain finance. Also, cloud-based portals are emerging as an alternative to enterprise TMS implementations (see Supply Chain Brief: Cloud-Based Portals Are Disrupting Logistics Procurement).

Sample Vendors: Blue Yonder, Descartes, E2open, Freightgate, Haven, Infor Nexus, LOG-NET, Oracle, SAP

No. 6: Multicarrier Parcel Management Solutions

Multicarrier parcel management solutions are focused on the optimization and execution of parcel transport. These tools help companies select the best parcel carrier from among all contracted carriers. Their selections are based on order characteristics (such as weight and dimensional properties) and
delivery rules (such as delivery time and delivery zone), while considering the cost differentials of various carrier offerings. These tools also enable shippers to manage the creation of labels, create shipper manifests, provide status messages to customers or customer service representatives and manage carrier rates. TMS and warehouse management system vendors partner with parcel vendors to expand the capability in their own toolset, as most TMS vendors have no plans to develop these capabilities themselves. Also, parcel vendors connect to a completely different set of carriers than FTL or LTL, rail, ocean or air carriers, which are the typical carriers TMS solutions focus on. These solutions are covered in Gartner's Market Guide for Multicarrier Parcel Management Solutions.

Sample Vendors: BluJay Solutions, Centiro, Descartes, Ingram Micro, Logistyx Technologies, Metapack, Pitney Bowes, ProcessWeaver, ProShip-FOG Software Group, RateLinx, ShipHawk, WiseTech Global-Pierbridge

No. 7: Vehicle Routing and Scheduling Solutions

Vehicle routing and scheduling (VRS) solutions are used by asset-based companies, either carriers or shippers with a private fleet, to plan and schedule their assets. These solutions are specialized transportation management applications aimed at organizations that directly (for example, private fleet) or indirectly (such as a dedicated contract fleet) control and manage shipping assets (such as tractors and trailers) and resources (such as drivers). The solutions create plans for the enterprise assets and resources that are considering demands (such as orders or projected daily/weekly route requirements). The tools then build schedules and routes that consider many constraints (for example, equipment availability, delivery times, demand volume, equipment capacity, driver rules and hours of service) and organize the goals for fleet operation (perhaps to minimize miles and costs). These tools are typically used to develop route plans that meet all delivery objectives at minimal cost and mileage based on the firm's input (such as from orders), rules and constraints. The goal is to minimize transportation costs while satisfying feasibility constraints for when and where stops are visited, what can be loaded in each vehicle and what routes drivers can serve.

Sample Vendors: Dassault Systèmes (DELMIA Quintiq), Descartes, Omnitracs, ORTEC, Aptean, Trimble, Verizon Connect, Wise Systems

No. 8: Last-Mile Delivery Solutions

VRS applications traditionally were used to route shipments from warehouses to distribution centers or stores, and less so to the end consumer. However, there is a continuous increase in e-commerce operations and a number of organizations, especially in retail and the food industry, are changing their business models to better serve business-to-consumer (B2C) transactions. This increase has fueled the need for routing applications that specialize in last-mile operations, which we call last-mile delivery solutions.

Although last-mile-focused VRS solutions share many features with the more traditional VRS applications, at least two focused areas make them different:
Increased focus on customer experience — Last-mile-focused solutions allow for the collection of end-customer feedback to run analysis that helps improve service levels or provide further convenience to select a more specific delivery window. Whether it is the performance of a specific driver on timeliness, customer care or how parcels are handled, the data received in feedback forms can provide insights as to where services can be improved.

Capabilities to manage more diversified fleets and routing options — These solutions are capable of considering different types of fleets, such as crowdsourced fleets, delivery robots or drones. Additionally, they cover other delivery methods that consider technicians or other services for the preparation of the route or other capabilities, such as parking locations or building entrances.

Sample Vendors: Bringg, Descartes, DispatchTrack, FarEye, Locus, Milkman Service Delivery, Onfleet

No. 9: Carrier-Centric TMS

These are holistic solutions to manage transportation orders, plan the fleet and resources and drivers, invoice customers, and provide other asset-specific capabilities as well. These capabilities enable a freight and logistics company to negotiate rates with clients to final billing of loads.

These solutions are mode-specific, so we see different offerings for road, rail, ocean and air. (At this time, Gartner has no specific information on rail-carrier-specific TMS solutions):

- Carrier-Centric TMS (Road) — These solutions manage over-the-road transport orders, plan the fleet and resources and drivers, and invoice customers, as well as provide other asset-specific capabilities. Carriers and logistics service providers (LSPs) use these solutions to negotiate rates with a shipper as well as perform final billing of loads.
  - Sample Vendors for Road: Carrier Logistics, HighJump, Mastery, McLeod Software, Revenova, Rose Rocket, Trimble

- Carrier-Centric TMS (Ocean) — These systems help ocean carriers manage their fleets, invoice customers, provide network connectivity and send appropriate status messages, manage rates, comply with customs and more.
  - Sample Vendors for Ocean: Accenture, CargoSmart, Descartes, E2open, Freightgate

- Carrier-Centric TMS (Air) — These systems help air cargo companies, 3PL providers, forwarders and even airports manage their air cargo business. Functionality can include booking, customer portals, planning and warehousing.

No. 10: Dispatch Solutions
A dispatch system allows organizations (typically, after shipments have been routed) to dispatch a trip to a specific asset and a specific driver and then manage variables such as driver pay, driver hours of service, etc. Several vendors offer routing and dispatching within a single platform.

**Sample Vendors:** HighJump, McLeod Software, Trimble

**No. 11: Brokerage Solutions**

These solutions are geared specifically to brokers with capabilities such as many-to-many customer and carrier rates, order management, invoicing and planning.

**Sample Vendors:** 3Gtms, DAT, Descartes-Aljex, McLeod Software, MercuryGate, Rose Rocket, Trimble, Truckstop.com, ZUUm

**No. 12: Freight Forwarder Solutions**

These solutions are geared specifically to freight forwarders and their operations, including supply chain design and planning, air and ocean freight, customs brokerage, transportation, logistics and international trade services.

**Sample Vendors:** BluJay Solutions, CargoSmart, Freightgate, Intellect Technologies, LOG-NET, Logisuite, Magaya, MercuryGate, Softlink Global, WiseTech Global

**Other Vendors/Solutions**

Additional companies focus in other areas, such as freight payment and audit, global trade management, control towers and visibility. They may also market part of their solution sets under transportation management. Gartner does not consider these TMS solutions and therefore publishes separate Market Guides addressing these technologies and vendors.

A growing number of freight-matching platforms are coming into the market that, in some cases, have some type of TMS capability, or they may partner with TMS vendors mentioned earlier. These technology platforms focus on matching demand for transportation from shippers with real-time, available supply of transportation from the carriers.

**Sample vendors in this area include:** Cargomatic, Convoy, Emerge, Loadsmart, Transfix, Truckstop.com and Uber Freight. (See Market Guide for Digital Freight Models for Road Transportation.)

**Engage Vendors That Offer the Solutions in Line With Your Needs**

Transportation leaders should look at their transportation strategy and maturity when making the right TMS selection. TMS capabilities are distributed based on operational complexity and sophistication in transportation operations. The more complex the transportation network operations, the more advanced the TMS needs to be and the more capabilities it includes. In addition, the importance of integration or convergence with other supply chain functions increases with higher levels of complexity to maximize
the required level of efficiency. So make sure the solution you select fits your strategy, maturity and complexity.

Companies that are looking to invest in technologies give preference to solutions that are cloud-based and can be implemented quickly. They should also allow the companies to achieve value in a short amount of time. Most vendors of TMS solutions offer cloud-based solutions, but make sure you also understand the solution capabilities, complexity, resources and time required to implement the solution.

Vendor solutions often look very similar, so understand the differentiation between the vendors. The gaps in core North American TMS solutions for planning, execution and settlement functionalities have narrowed among many vendors, but several continue to distinguish themselves with a more compelling TMS vision regarding functionality, mode coverage, technology and globalization.

Although functionality remains at the top of the list of user evaluation criteria, near-functional parity for core TMS capabilities is found among the major TMS providers. However, vendors that focus on the small and midmarket typically don't need to offer the same depth and breadth of functionality. On the other hand, factors such as simplicity, ease of implementation and the quality of the user interface (UI) and user experience (UX) become inversely important. Only a few vendors focus on both the enterprise and midmarket, which requires them to have an extensive library of capabilities while offering ease of use and implementation at a lower price tag.

We see notable differences between European vendors and North American vendors; historically, North American vendors have focused much more on planning and optimization, where European vendors have focused more on the execution and carrier networks. Several North American vendors have started selling more in regions outside of North America. At the same time, several of the large European players are focusing more attention on the North American market (see Critical Capabilities for Transportation Management Systems). Identify which vendors address your market and industry and what experience they have.

Global capabilities are important to customers. Several TMS products continue to add global capabilities (for example, multiple languages, currencies, geographic data or rules) and functionality for complex, multileg and multimodal international logistics.

Different models are used to price these different TMS solutions in the market, depending on the type of solution and the end user. TMSs are typically charged as a licensed model or on a subscription basis with the total freight spend (freight under management [FUM]) being the determining factor for shippers). LSPs using a TMS are charged, however, on a transaction basis. TESs charge on a transaction basis as well because these are more executional systems. Managed TMS solutions include these charges plus an additional charge for the resources to run the TMS, which can be replaced by a profit-sharing model. The way a vendor prices a solution might have an impact on overall total cost of ownership as some industries have smaller volumes of freight but comparably higher freight costs. In those cases, a model based on FUM might be high compared to the benefits the solution will offer.
Acronym Key and Glossary Terms

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<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>TMS</td>
<td>Transportation management system</td>
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<tr>
<td>TES</td>
<td>Transportation execution system</td>
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<tr>
<td>3PL</td>
<td>Third-party logistics provider</td>
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<td>FTL</td>
<td>Full truckload</td>
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<td>Freight under management</td>
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<td>Logistics service provider</td>
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Document Revision History

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Recommended by the Authors

Magic Quadrant for Transportation Management Systems
Key Considerations for Supply Chain Leaders Evaluating Transportation Management Systems
Hype Cycle for Supply Chain Execution Technologies, 2020
How to Calculate the Return on Investment for a Transportation Management System
Market Guide for Multicarrier Parcel Management Solutions
Market Guide for Global Trade Management Software
Market Guide for Vehicle Routing and Scheduling
Market Guide for Real-Time Transportation Visibility Platforms
Market Guide for Freight Audit and Payment Providers
Market Guide for Digital Freight Models for Road Transportation