



WMS-TMS-ERP - pillars for modern supply chain execution

In today's supply chains, the flow of information is as critical as the flow of goods. To secure an efficient flow of both information and goods, companies are investing in best-fit solutions to maximise their business benefits. From a supply chain execution perspective, the main solutions are Enterprise Resource Planning (ERP), Warehouse Management Systems (WMS), and Transportation Management Systems (TMS), which form the digital backbone of how organisations plan, execute, and optimise their operations.

In this Point of View, we focus on these three systems and their roles and relationships with each other. Furthermore, we provide guidance on what to consider when evaluating the need for standalone WMS and TMS solutions versus modules or add-ons available in common ERP systems.

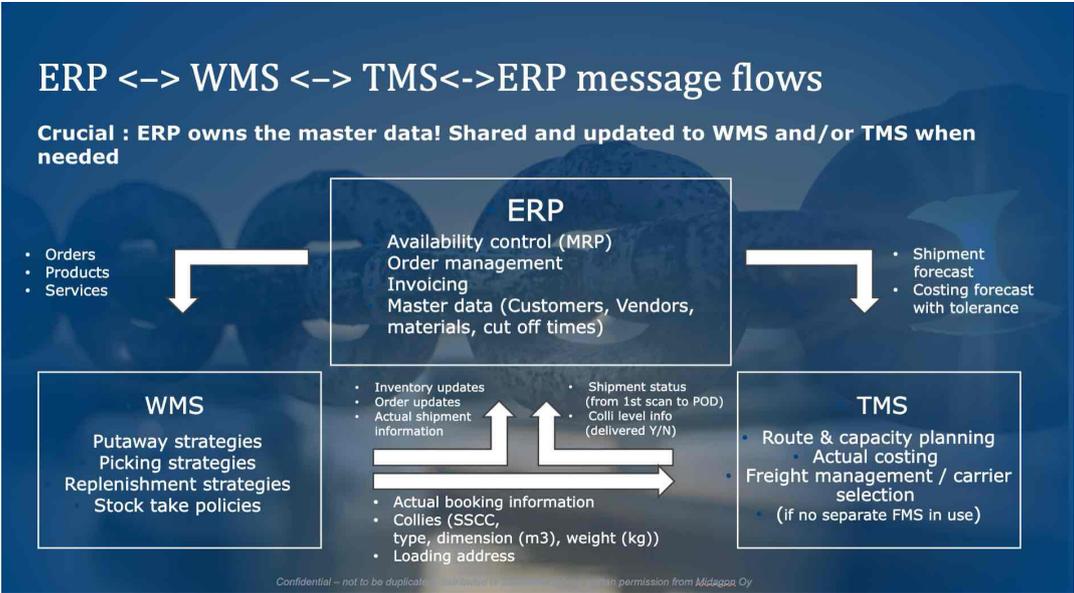
The role of ERP-WMS-TMS - Why These Three Systems Matter

ERP, WMS, and TMS together define how well your organisation can plan, execute, and continuously optimise. Focusing on a company perspective to inbound, in-house, and outbound operations, let's review at a high level the role of the above systems, without taking a stand on whether they are standalone or part of an ERP offering.

ERP — the enterprise control tower. The ERP manages financials, master data, procurement, order management, and planning — providing the enterprise-wide “single source of truth.”

WMS — the engine of physical flow. The WMS governs receiving, put-away, storage, picking, packing, and real-time inventory visibility.

TMS — the gatekeeper of outbound performance. The TMS controls the outbound movement of goods: carrier selection, load planning, routing, and freight cost optimisation.



Together, these systems determine how efficiently an organisation converts orders into delivered value. The strategic challenge lies not only in selecting the right tools, but in defining how these systems interact: should the ERP host embedded WMS/TMS capabilities, or should specialised, standalone solutions be integrated?

The answer depends on the organisation's scale, process complexity, automation level, and long-term growth ambitions. The following tables illustrate typical differences between embedded ERP solutions vs. standalone solutions.

Generic overview and approach of WMS functionalities within ERP or on a separate WMS solution.

Process	Embedded WMS functions within ERPs	Standalone WMS (integrated with ERP)
Planning: Wave planning & order release Slotting	<ul style="list-style-type: none"> Manual & template-based wave creation Grouping by criteria Basic scheduling Rule-based slotting and periodic re-slotting (velocity/ABC) to shorten travel 	<ul style="list-style-type: none"> Dynamic auto-wave creation with AI/ML Real-time wave rebalancing Labor optimization Integration with robotics/WES for wave execution Continuous/AI-assisted slotting with automated move lists and impact analysis
Execution: Inbound receiving & quality Directed put-away Picking orchestration Replenishment Packing, cartonization & shipping	<ul style="list-style-type: none"> Purchase order -based receipts and picking Advanced shipping notification handling Inspection Lots/serials/attributes capture Putaway using rules based on item attributes, location capacity and zone preferences Rule-based pathing Threshold-based packing into containers/HUs Basic cartonization 	<ul style="list-style-type: none"> Deeper ASN/attribute capture Advanced returns functionalities Automation readiness AI/ML optimization Automation orchestration Waveless/order streaming Voice and AI-driven pick path optimization Advanced cartonization (dim/void minimization) Auto-pack (rules/AI)
Optimization and analytics: Operational monitoring & analytics	<ul style="list-style-type: none"> Wave/task status lists & workbenches Basic KPI dashboards Exception handling 	<ul style="list-style-type: none"> Embedded real-time ops workbenches Labor dashboards (engineered standards) In some suites 2D/3D/digital-twin style visibility
Financial and administrative: Traceability Compliance labelling 3PL / multi-client	<ul style="list-style-type: none"> Lot/batch/serial number, forward & backward traceability Real-Time Visibility Compliance label templates for regulatory standards (GHS, GS1, FDA) Lot/serial and expiration data on labels Integration with product compliance and quality modules Basic multi-owner inventory sometimes possible in ERP 	<ul style="list-style-type: none"> Automation & WES telemetry in the trace log Graphical/digital-twin trace explorers Real-time, operational label printing during warehouse tasks (receiving, picking, shipping) Automation-ready (robotics, conveyors, voice workflows) Retailer-specific and returns compliance labelling True multi-client segregation and 3PL activity billing Rapid client onboarding and portals
Integration: Mobile/RF execution Systems integration (ERP/OMS/TMS/YMS)	<ul style="list-style-type: none"> Handheld scanning across receiving, picking, replenishment and counting Basic tasking for picks and counts Standard data flows for orders, POs, shipments and inventory 	<ul style="list-style-type: none"> Voice-directed operations as a standard option (not only via partners) and richer device workflows Broader prebuilt connectors Event-driven APIs and robotics/automation orchestration

Generic overview and approach of TMS functionalities within ERP or on a separate TMS solution.

Process	Embedded TMS functions within ERPs	Standalone TMS (integrated with ERP)
Planning: Route optimization Load planning and optimization Carrier selection Order management	<p>Often a subset of advanced TMS functions e.g.:</p> <ul style="list-style-type: none"> Basic route optimization without real time adjustments Moderate load planning capabilities incl. transportation needs forecasting ERPs typically manages a static list of carriers without automation or optimization features Order mngt supporting transportation planning requires manual activities and is lacking visibility without external processes being involved 	<p>Holistic end to end transportation mngt:</p> <ul style="list-style-type: none"> Early planning based on orders Combined inbound/outbound deliveries/orders Optimized transportation planning i.e. route optimization, load planning and optimization Real time carrier selection Advanced transportation order mngt incl. dynamic re-routing or exception mngt
Execution: Shipment tracking Tendering and dispatch Document management	<ul style="list-style-type: none"> Basic shipment tracking capabilities often not real time Limited and manual processes for tendering and dispatch Shipping documents can be automatically generated and centrally stored Document mngt may lack automation features and would require integrations to ensure external collaboration 	<ul style="list-style-type: none"> Advanced, real time shipment tracking and status updates Support for dynamic and complex tendering process Support for efficient dispatch process Automated trade documentation and customs compliance management incl. good integration capabilities
Optimization and analytics: Freight management Carrier management Reporting and analytics	<ul style="list-style-type: none"> Basic freight management Basic carrier management Basic reporting is available but lacking advanced analytics 	<ul style="list-style-type: none"> Strategic freight management Strategic carrier management Real time data driven decision making Advanced reporting and analytics
Financial and administrative: Cost management Billing and settlement	<ul style="list-style-type: none"> Basic charge calculation and freight settlement Limited freight auditing capabilities Limited transportation rate mngt capabilities 	<ul style="list-style-type: none"> Advanced charge calculation and freight settlement Dispute management Billing and settlement Real time cost projection
Integration	<ul style="list-style-type: none"> Data is shared inside ERP directly without duplication Standard ERPs may struggle to integrate with external systems like carrier network or real time tracking providers 	<ul style="list-style-type: none"> Connects with other systems, such as ERP, warehouse management system (WMS), customer relationship management (CRM) systems and external parties

As a summary, we see the following benefits of selecting a dedicated standalone system:

- **Focus and specialisation:** Dedicated WMS or TMS provides significantly more depth, specialised functionality, and real-time optimisation to manage complex supply chains.
- **Scalability and flexibility:** They are built to manage large data volumes and can adapt to changing business needs.
- **Improved integration** capabilities with a larger ecosystem enable process and system automation, including enhanced collaboration.
- **Granular visibility** into process-related data (e.g., efficiency in the warehouse, real-time shipment tracking, freight cost analysis) helps businesses to identify bottlenecks, optimise operations, and make informed decisions.

Questions to be answered when companies are evaluating the current system landscape renewal around the warehouse and transportation management:

1. Strategic level – the “Why?” Strategic Alignment

The goal is to ensure that the chosen system — whether ERP-native or best-of-breed — supports current and future strategic imperatives such as faster fulfilment, cost efficiency, and supply chain agility.

- How well do our current ERP capabilities align with our long-term fulfilment and supply chain strategy?
- Could a best-of-breed WMS/TMS strengthen our competitive position through faster fulfilment, higher accuracy, or reduced cost?
- Should we pursue a single, group-level WMS/TMS to unify logistics processes across multiple ERPs?

Business & operational complexity

Operational complexity is a key driver for system choice. Understanding the level of operational sophistication helps determine whether specialised WMS/TMS solutions are necessary.

- How complex are our inbound and outbound flows compared to what our ERP can manage (multi-site, automation, 3PLs, international freight)?
- Can a single WMS/TMS platform support process variations required by multiple ERP-driven business units?
- To what extent do our operations rely on external logistics partners or service providers?

Architectural decision point

Choosing between ERP-native logistics modules and standalone WMS/TMS platforms involves striking a balance between integration simplicity, functional depth, and flexibility.

- Which architecture best supports our operational model: ERP with integrated logistics modules or standalone WMS/TMS systems?
- How will our choice affect system ownership, upgradeability, and vendor dependency?
- How will a shared WMS/TMS integrate consistently with different ERP platforms or versions?

2. Tactical level – the “What?” Functional requirements

Evaluating needed features should focus on capabilities that create measurable business value, rather than on technical feature lists. The right system should optimise processes and improve the quality of decision-making.

- Does our ERP (or its logistics modules) fully support warehouse and transport workflows without excessive customisation?
- Which advanced capabilities (e.g., slotting optimisation, wave planning, dynamic routing, and freight auditing) are essential to our business performance?

Integration & data flow

A well-designed integration layer ensures data consistency, eliminates silos, and supports real-time decision-making. Clear ownership of master data and transaction synchronisation is essential for operational visibility and control.

- How seamless and sustainable would the integration be between ERP and a standalone WMS/TMS?
- Where should the master data (items, locations, carriers, rates) be maintained to ensure consistency and control?
- How will transactions, such as goods movements, shipment status, and freight costs, flow between systems?

Scalability & future growth

Technology decisions should anticipate future expansion, automation, and changing business models. The selected system landscape must support scalability in both process volume and functional sophistication without requiring frequent reimplementations or heavy customisation.

- Can our ERP environment scale effectively as we add sites, automation, and international operations?
- Would a standalone WMS/TMS provide greater agility to adopt new technologies (robotics, IoT, e-commerce models)?
- How easily can each option adapt to business model changes (e.g., direct-to-consumer, drop-shipping, or 3PL collaboration)?

3. Financial and ecosystem considerations – the “How much?” and “With whom?”

Total cost of ownership (TCO)

A full cost assessment must consider more than just licenses or implementation fees. Integration, upgrades, maintenance, and resource requirements determine the true cost of ownership.

- What is the total cost of implementing, integrating, and maintaining each option over a 5–10-year horizon?
- How do ERP customisations impact future upgrades and vendor support?
- What are the recurring costs for licenses, hosting, and third-party services?

Vendor & Ecosystem Considerations

The strength of the vendor ecosystem impacts long-term support, innovation, and system stability.

- How strong is the ERP ecosystem in logistics extensions (certified add-ons, mobile tools, industry accelerators)?
- Are there reliable WMS/TMS vendors and integration partners available regionally or globally?
- How does each vendor's roadmap align with our digital and automation strategy?

ROI and value realisation

Every system decision must be supported by a clear business case. Value realisation should be measured by both process improvements and the degree of operational harmonisation achieved across ERP instances.

- What measurable improvements are expected in labour productivity, accuracy, service levels, and freight costs?
- What is the expected payback period and internal rate of return for each solution scenario?
- How will we measure ongoing value realisation post-implementation?

4. Governance & compliance – the “How we manage it?”

Risk & change management

Technology change inevitably affects people, processes, and culture. Effective change management ensures business continuity during transition and builds internal capabilities for system governance and optimisation. Vendor and integration risks must also be proactively managed.

- How significant will operational disruption be during implementation?
- How prepared is the organisation for process and role changes introduced by new systems?
- What is the risk of a vendor lock-in, dependency, or future incompatibility?

Compliance & industry requirements

The chosen platform must provide robust data integrity, auditability, and certification support to ensure regulatory compliance and customer trust.

- Are there regulatory or customer-driven requirements (e.g., audit trails, batch traceability, labelling standards) that the ERP cannot meet?
- Does a best-of-breed WMS/TMS provide stronger compliance and reporting capabilities for our industry?

How can Midagon help?

Midagon supports organisations in navigating the complex decisions around ERP, WMS, and TMS by providing an independent, holistic, and business-driven approach to supply chain system renewal. We assist in aligning technology with strategic goals, optimising operational efficiency, and ensuring long-term scalability.

Midagon acts as a trusted partner throughout the entire journey — from strategy to implementation — ensuring that supply chain system decisions are future-proof, financially sound, and operationally transformative.

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