

RESEARCH REPORT

Is Logistics at a Tipping Point for Cloud and Emerging Technology Adoption?



Survey of supply chain professionals reveals top goals, challenges, and technology investment priorities

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With supply chain professionals facing challenges such as cost containment, lack of real-time visibility, and the need to maintain high customer service levels, there are reassuring trends on the technology front.

According to a new survey of supply chain professionals, roughly one-third of respondents see cloud solutions as being a “game changer” or providing significant positive impact (see Figure 1). While many have yet to adopt advanced technologies, including artificial intelligence (AI) and blockchain, respondents believe in their potential, and in fact, see these rising in importance over the next two years.

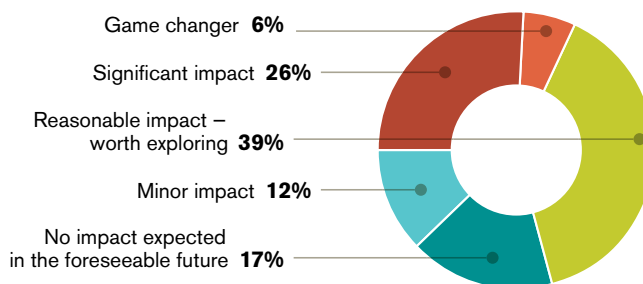
The study —“*Is Logistics at a Tipping Point for Cloud and Emerging Technology Adoption?*”— is sponsored by Oracle and conducted by Peerless Research Group (PRG) on behalf of *Supply Chain Management Review* and *Logistics Management* magazines. The survey addresses logistics priorities and hurdles, adoption of supply chain execution software and deployment method (cloud vs. on-premise), and views on the benefits of cloud software and cloud-enabled emerging technologies.

FIGURE 1

Figure 1

Roughly seven out of 10 survey respondents see cloud software as a “game changer,” or carrying significant or reasonable impact on growth. Approximately one-third (32%) see cloud solutions as game-changing or holding significant positive impact.

Extent to which cloud-based applications could provide a competitive advantage



The majority of survey respondents are enthusiastic about the value of cloud solutions, even though few see themselves as leading-edge technology adopters. The survey indicates the market is taking a pragmatic approach to technology investment, seeking solutions that address core challenges such as cost containment and customer service, as well as specific issues like inventory and shipment visibility. This pragmatism extends to adoption of transportation management, warehouse management, and global trade management software solutions.

Among respondents’ top challenges are cost containment, collaboration, and visibility, which align well with the problems addressed by cloud software through enhanced information sharing, advanced analytics, and low-cost deployment. This points toward healthy future adoption of cloud logistics solutions.

The issues of greatest importance to respondents are consistent with other supply chain industry surveys. For example, in the survey for [MHI’s 2019 Annual Industry Report](#),¹ the top three industry challenges were the inability to find enough labor, customer demands for lower delivered cost, and pressures for faster response time.

Overall, companies with supply chain operations are under intense pressure to accurately get the right goods to customers on time, under tighter timeframes, and optimizing resources, while not allowing customer service levels or profit margins to suffer. As this new research suggests, supply chain professionals are increasingly viewing cloud solutions as a good fit with attainment of these key objectives.

Top Logistics Challenges

Companies with supply chain operations must deliver fast, accurate order fulfillment at the lowest possible cost. This not only makes for a more profitable operation, it keeps customer satisfaction high to drive greater revenue. Answers to survey questions around top challenges reflect a strong focus among respondents on operational effectiveness as a means of driving business growth.

When asked to rate how important key issues are in relation to logistics strategy, the issues that score highest in importance are: keeping customer service levels high, lowering costs, and improving efficiencies in logistics operations (see Figure 2). This indicates that respondents see operational effectiveness as the path to revenue growth, rather than simply being a set of inward-facing measures.

FIGURE 2

Top long-term logistics goals

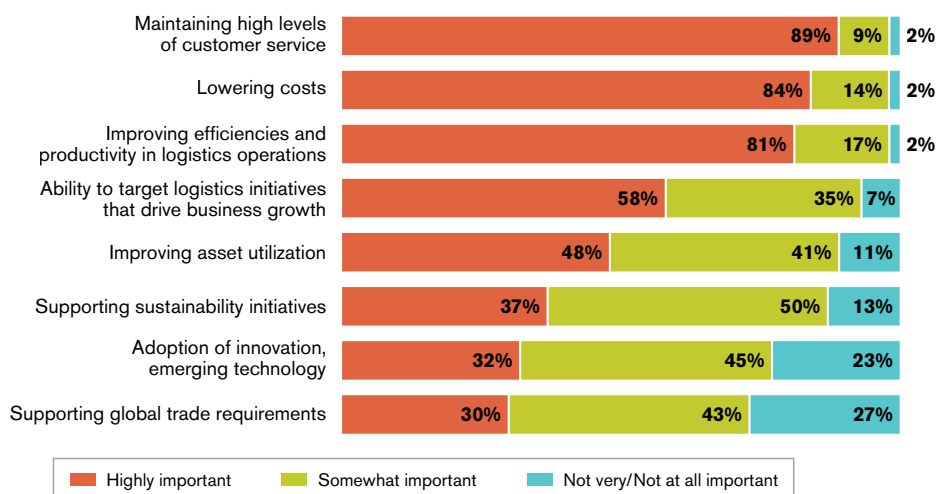


Figure 2
Maintaining a high customer service level and managing costs are the factors respondents most commonly see as "highly important."

When asked about the biggest obstacles with logistics operations (see Figure 3), controlling costs again looms large (44% named it as such). Other common problems include lack of real-time visibility into shipments (32%), inadequate data analysis and reporting (31%), and integration complications between logistics applications and internal and/or partner platforms (29%). Updated cloud logistics software can be especially beneficial in areas such as controlling costs, visibility, and analytics.

FIGURE 3

Main obstacles in achieving logistics and warehouse goals

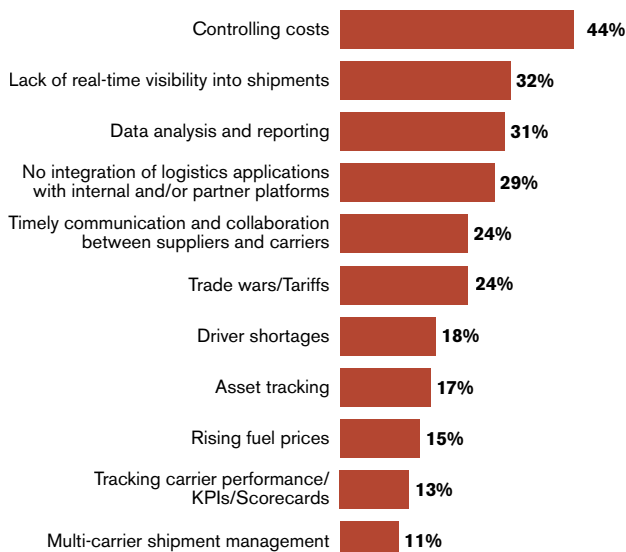


Figure 3
Common obstacles cited by respondents can, in some cases, be tied to legacy on-premise system shortcomings, such as inadequate data analysis.

Looking ahead to top priorities over the next 24 months, respondents again overwhelmingly identify reducing operational costs as the top priority, followed more distantly by challenges including warehouse space utilization and inventory optimization. These findings point to a market that is keen to improve efficiencies, but cautious about deploying solutions that would raise costs.

This pragmatic approach to priorities and hurdles isn't surprising, given that most respondents aren't leading-edge technology adopters (see Figure 4). Overall, they see themselves in the center of the technology adoption curve, willing to adopt solutions only after innovators and early adopters have proven out the benefits.

FIGURE 4

Organizations as adopters of supply chain technologies

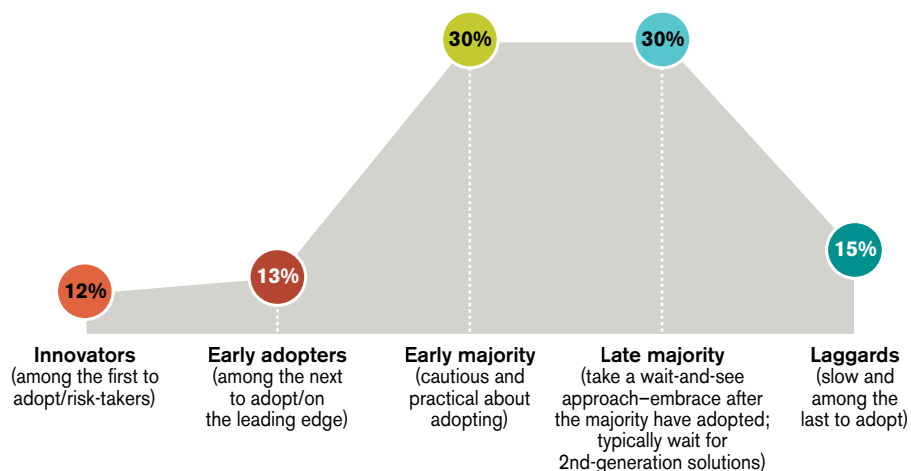


Figure 4

The majority of respondents see themselves as being either cautious or taking a wait-and-see approach for adopting technology; this may well explain current adoption levels for newer technologies.

While more than one in 10 respondents views their organization as an early adopter/innovator, a slightly larger percentage acknowledges they are among the last to adopt new technologies. However, as customer satisfaction and logistics execution pressures mount, and legacy systems are increasingly insufficient for key supply chain processes, it is possible that considerably more late majority adopters and some laggards will switch over to cloud-based solutions that utilize advanced technologies, such as built-in AI algorithms. There is a tipping point for technology adoption, even for a generally conservative response base.

Investing in Technology

Given continued growth in the economy and fundamental changes in logistics operations due to e-commerce growth and omni-channel execution, the level of investment in logistics solutions appears healthy (see Figure 5). When asked if spending on logistics and warehouse solutions will increase in 2020, 41% expect an increase while 33% forecast spending to stay about the same. Only 5% anticipate a decrease in spending.

FIGURE 5

How the level of warehousing/transportation/logistics technology investments in 2020 will compare with 2019

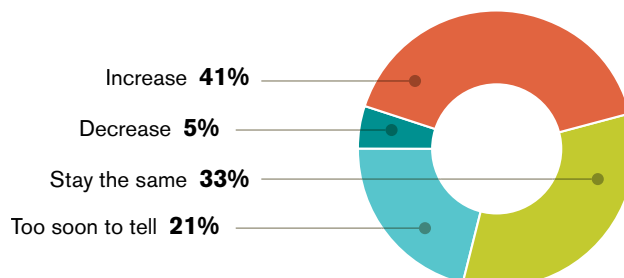


Figure 5

Three out of four say investments in technology will either increase (41%) or remain the same (33%). One-fifth are unsure of their organization's expected spend for 2020.

When asked about the percent of company revenue devoted to transportation and logistics operations in 2019 (not just logistics-related technology), the average among respondents is 22%, with a median of 10%. These spend levels are significant given that many companies also needed to spend appreciably on manufacturing, product development, marketing, and other areas.

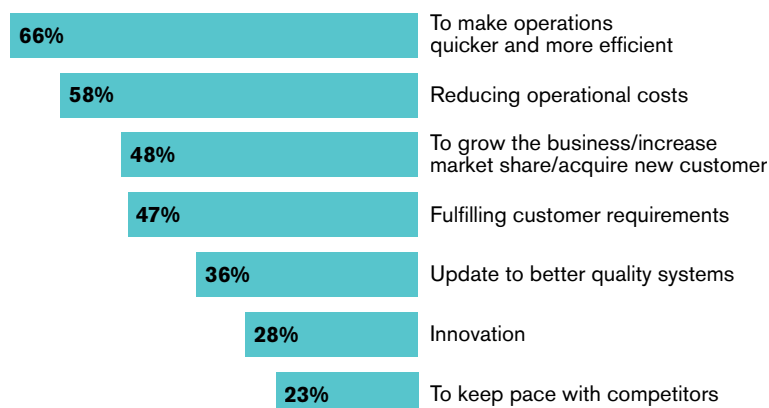
The focus respondents have on making operations more effective is seen once again when asked “why” companies will invest in new technologies (see Figure 6). Speeding up operations, reducing costs, and growing the business are again the most frequently selected priorities.

Figure 6

The most common drivers for technology investments in 2020 are operational efficiency and cost effectiveness, followed closely by solutions that will help grow the business and meet customer requirements.

FIGURE 6

Main reasons for investing in new technologies in 2020



The survey also asked about logistics operations’ priorities for the next 12 months (see Figure 7). The top priority is clearly reducing costs, followed by improvements in space utilization, inventory optimization, and business process/workflow efficiencies. This “look ahead” to operations’ priorities closely mirrors the current main obstacles respondents face (see Figure 3). Interestingly, for both questions, respondents indicate interest in improving areas such as workflow, data analysis, communication, collaboration, and planning, all of which are a function of transportation management system (TMS), warehouse management system (WMS), and global trade management (GTM) software solutions.

FIGURE 7

Top priorities for logistics operations during the next 12 months

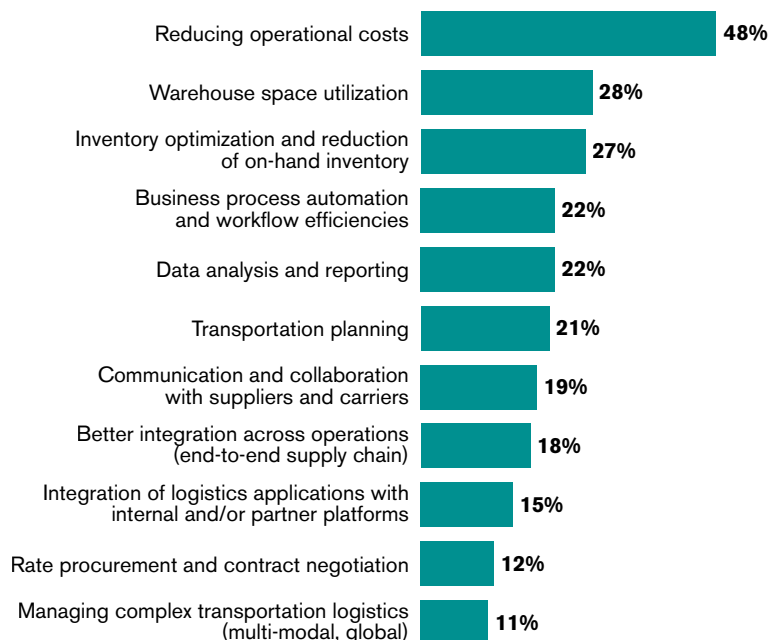


Figure 7

Looking ahead to priorities over the next 12 months, respondents will focus on cost containment and space utilization improvements, but also areas with a clear IT component such as data analysis and reporting.

Across application categories, those who are deploying via the cloud tend to be more “highly satisfied,” while those not on the cloud (either on-premise or manual) are more likely to be “not satisfied” or just “somewhat satisfied.” This suggests a growing market for cloud solutions, with many companies dissatisfied with current approach (see Figure 8).

FIGURE 8

Satisfaction with deployment methods of WMS, TMS, and GTM applications

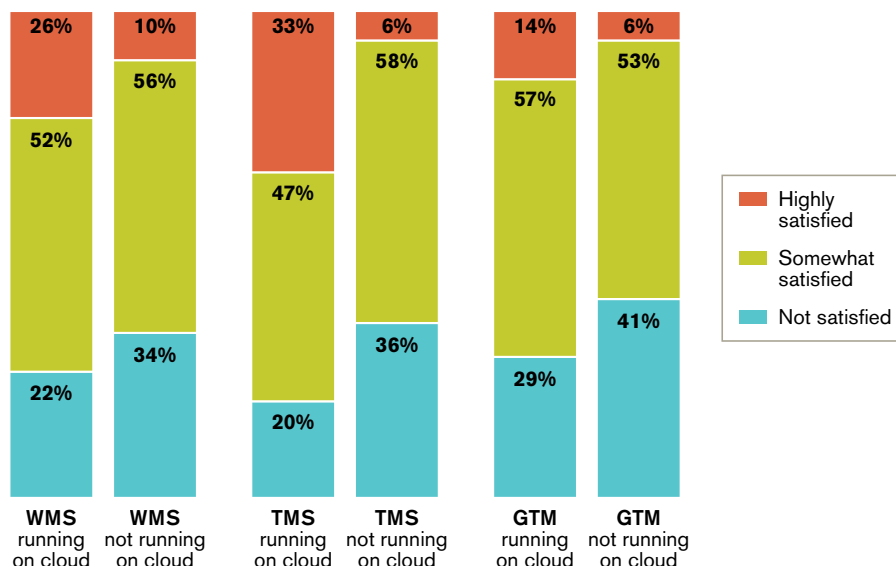


Figure 8

The survey indicates that the market for cloud logistics solutions is still emerging. Many current non-users are dissatisfied with legacy approaches, and thus primed for adoption of cloud TMS, WMS, and GTM. Respondents currently on cloud solutions are generally more “highly satisfied” than those with on-premise or manual processes.

Cloud solutions for TMS, WMS, and GTM differ from on-premise solutions in that back-end IT infrastructure is not required at the end-user organization. No servers, IT infrastructure, or database software is needed because the software is run by the cloud provider. This tends to speed up deployment and reduce IT costs, especially because cloud software is paid for on a subscription basis.

Additionally, today’s cloud logistics solutions embed advanced analytics, and some leverage AI technology to enhance planning capabilities that lead to cost reduction. While on-premise software may offer some advanced features, cloud solutions typically benefit from frequent functionality enhancements, the latest in analytical capabilities, open application programming interfaces, and support for advanced technologies such as blockchain and Internet of Things (IoT).

Warehouse Management Adoption & Priorities

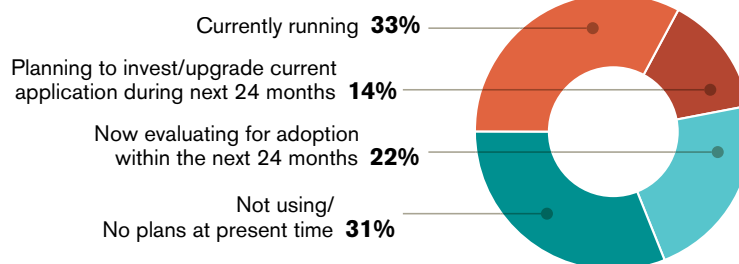
Many respondents lack a WMS solution today, the survey found. WMS software manages inventory, and executes order picking, packing, replenishment, goods put-away, cross-docking and shipment, as well as other activities necessary for order fulfillment at the warehouse level. More advanced solutions include labor and yard management, dock scheduling, and integration with materials handling systems.

Figure 9

Well over half of respondents are at companies that either currently use a WMS, are planning to deploy or upgrade in the near future, or are evaluating a solution; close to one-third lack a WMS today.

FIGURE 9

WMS usage and evaluation



WMS solutions help a supply chain in multiple ways. With e-commerce growing at a pace of about 15% annually, there are more labor-intensive operations involved in order fulfillment. By improving the way that orders are released to the floor to minimize picker travel and product touches, a WMS can help reduce the labor requirements needed with today's more frequent, smaller orders. A WMS also helps with issues such as space optimization and inventory turns: two of the key logistics priorities respondents indicate they are focused on.

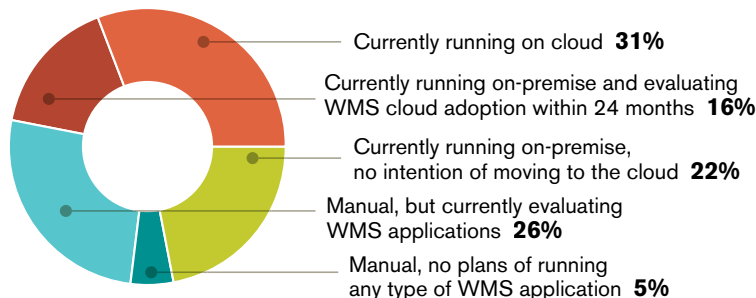
Respondents deploy WMS solutions in a variety of ways, with cloud WMS already in use by 31% (see Figure 10). Older or more traditional approaches include on-premise WMS software, as well as manual approaches. Although the survey doesn't ask respondents to elaborate on what they consider manual, many companies might have some type of system that can generate pick lists, and some means of tracking inventory locations, even if it's a spreadsheet or a simple database. Such approaches might work for small companies, which in the days before cloud solutions, lacked the IT resources to deploy a WMS on-premise.

FIGURE 10

Figure 10

More than four out of ten respondents are either running a WMS on-premise and evaluating cloud WMS, or rely on manual methods and are evaluating a WMS of some kind.

Means of deploying WMS



Respondent interest in cost control as a logistics priority is reflected in those aspects of WMS they feel are most important to their organization (see Figure 11). While understanding and controlling costs is highly ranked as an important WMS capability for respondents, WMS aspects such as inventory visibility, workflow efficiencies, and improved space utilization also help with cost-effective warehouse operations.

For example, a WMS is adept at organizing warehouse storage by how fast items or stock-keeping units move. This reduces travel time and costs in picking operations, and helps maximize inventory turns. With WMS cloud solutions, users also receive regular release updates, providing access to extensive reporting and analytics functions that monitor metrics, such as lines per hour picked and order fulfillment accuracy. With IT costs and data lag times common to legacy approaches, being able to rapidly deploy these capabilities via a cloud WMS could nudge more companies to adopt a WMS rather than stick with older approaches.

FIGURE 11

Most important aspects of warehouse management operations



Figure 11

The most valued aspects of WMS cited by respondents often tie back into operational cost efficiency.

Unlike with manual methods or some on-premise solutions, cloud WMS also combines all key functions in an integrated fashion across multiple sites and time zones. As one respondent running cloud WMS elaborated in a comment, with cloud WMS the organization achieves “a great integrated suite” of warehouse management functions.

Cloud Transportation Management Adoption

TMS solutions have been around for decades—nearly as long as WMS. While the breadth and depth of functionality varies by vendor, TMS solutions typically span freight rating and planning across multiple modes of transportation, freight tendering, freight billing, payments, and analytics. Some solutions bring in other functions, including shipment tracking and visibility tools, management of shipment events, fleet management, and workflow automation.

Among respondents, about one-third currently run a TMS, while another one out of three plan to adopt or invest in a TMS solution during the coming 24 months (see Figure 12).

FIGURE 12

TMS usage and evaluation

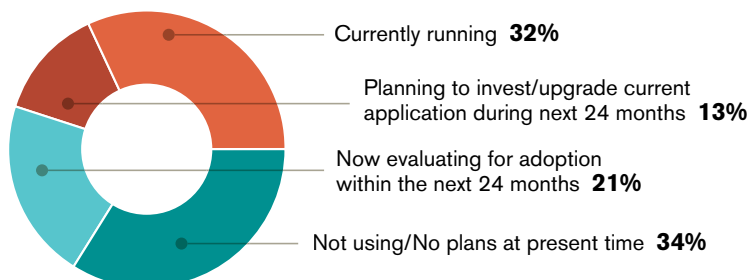


Figure 12

Roughly two-thirds of respondents are either currently using a TMS, planning to invest/upgrade, or evaluating solutions.

The TMS market has been strong in recent years, in part because of a robust economy and high shipment volumes, but also because of the transportation complexities involved with e-commerce. Analysts project continued strong growth for TMS, with one estimate from [Grand View Research²](#) that the market will rise at a compound annual growth rate of 16.2% through 2025.

Among respondents, 36% currently run a cloud TMS (see Figure 13). Cloud deployment is slightly higher among respondents for TMS than for WMS, which is not surprising given that many TMS software providers are now cloud-based or have cloud options. TMS also generally does not interact with automated machinery to the extent a WMS does, though a cloud WMS is capable of interoperating with warehouse automation.

FIGURE 13

Figure 13

Nearly half of those surveyed either already run or are evaluating cloud TMS.

Means of deploying TMS



When it comes to TMS functions thought to be most important to organizations (see Figure 14), in-transit visibility tops the list, followed by issues such as tracking on-time shipments and understanding costs. Some functions, such as invoicing, payment processing, and shipment planning, have long been part of TMS feature sets, though increasing logistics complexity calls for more advanced functions in these areas.

FIGURE 14

Figure 14

Visibility over shipments in-transit and being able to monitor on-time shipments are deemed the most important aspects of a TMS.

Most important aspects of transportation management operations



Most full-featured TMS solutions can address some of these functions, although because cloud TMS offers real-time information sharing and common access to powerful analytics, it tends to excel at broader functions such as reporting/data access, workflow efficiencies, and collaboration. When asked to elaborate on satisfaction with his organization's cloud TMS, one respondent called it "very robust and user friendly."

Global Trade Management Efficiencies Sought

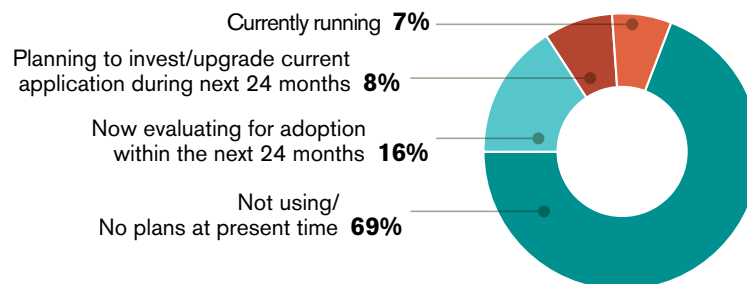
GTM solutions bring speed and efficiency to global trade processes, while supporting compliance with trade regulations. They offer workflow functions and document generation, and give users an understanding of total costs for global shipments. In recent years, GTM solutions have advanced by supporting real-time shipment tracking and Internet of Things technology, and some vendors are incorporating blockchain as a means of traceability over the transfer and sourcing of materials.

GTM is a growing solution category, but is generally a newer category compared with TMS and WMS. As such, it's not surprising GTM has a relatively lower current adoption level (see Figure 15).

FIGURE 15

Figure 15
One in three currently use or expect to deploy a GTM solution.

GTM usage and evaluation

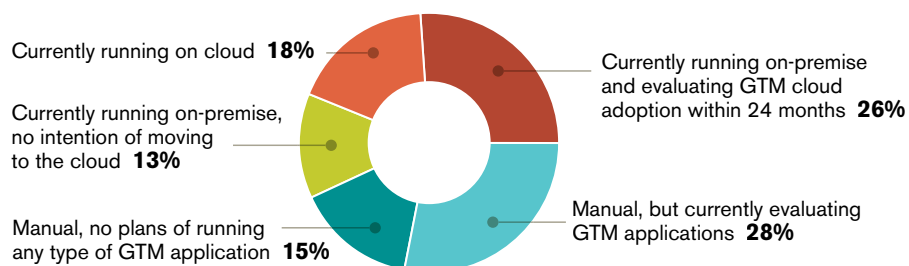


GTM processes can be carried out manually with spreadsheets, but this makes it very challenging to manage events, collaborate with others, and understand costs issues such as total landed cost, freight spend by mode, cost per mile, or fleet costs. Of those respondents using a manual GTM approach, the survey shows that 28% are evaluating GTM applications (see Figure 16). Another significant portion of respondents (26%) are running an on-premise solution, but evaluating cloud GTM.

FIGURE 16

Figure 16
More than one in four respondents either already run cloud GTM or are running on-premise GTM but evaluating a cloud solution.

Means of deploying GTM



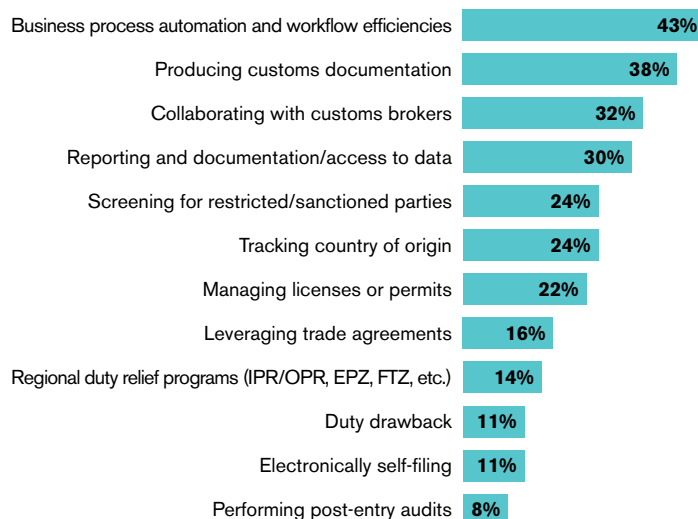
GTM capabilities desired by respondents include business process automation and workflow efficiencies, generation of customs documents, and collaboration with customs brokers (see Figure 17). Cloud technology's global accessibility can help with these desired features.

Additionally, GTM solutions that make use of robotic process automation (RPA) can further accelerate global trade workflows. RPA technology can be used to automate many routine business processes rather than have human workers generate an entire process and supporting documentation. In global trade, this results in workflow efficiencies because managers spend less time generating transactions from scratch and more time making informed decisions. The workflow support in a cloud GTM solution also reduces manual labor such as inputting data into documents or spreadsheets, which contributes to lower administrative costs.

Figure 17
Respondents place high importance on GTM aspects that streamline and accelerate global trade.

FIGURE 17

Most important aspects of global trade management operations



Desirable GTM functions also include compliance with specific permits, duty agreements, and country of origin data management. While in theory many of these details can be handled manually with some data kept in databases or customized point solutions, this manual approach requires great discipline and effort by the end-user organization. As one respondent without GTM software elaborated, its current approach is “overly manual and reliant on third parties.”

Views on Emerging Technologies

The survey reveals that respondent organizations have yet to widely adopt advanced technologies such as RPA and blockchain, but many see potential logistics operational benefits from them. In terms of adoption, RPA leads slightly over technologies such as IoT, blockchain, and AI (see Figure 18).

FIGURE 18

Usage and evaluation of emerging technologies

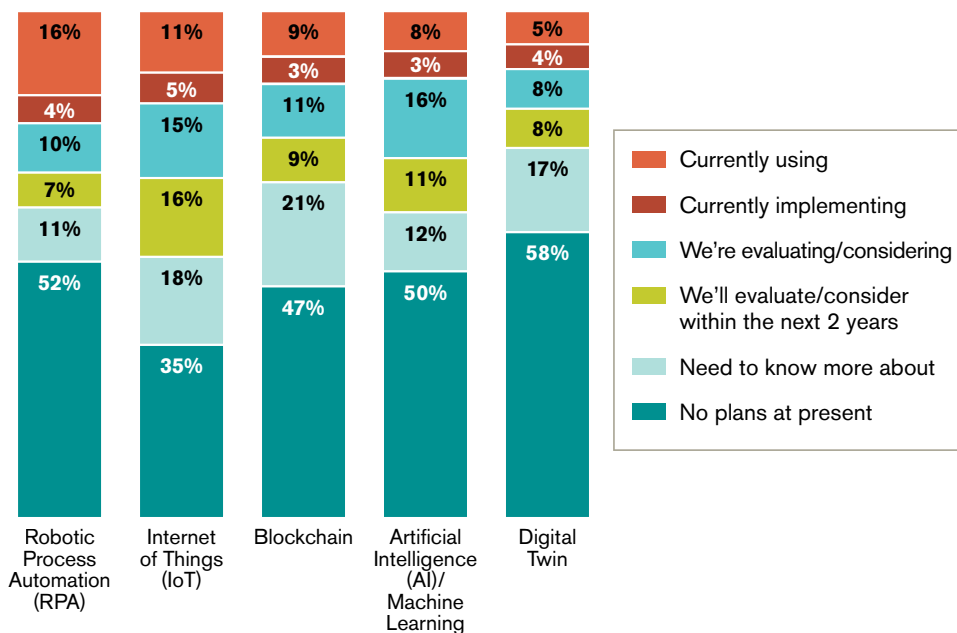


Figure 18
Use of advanced technologies, such as AI, blockchain, and IoT, is still emerging among respondent companies.

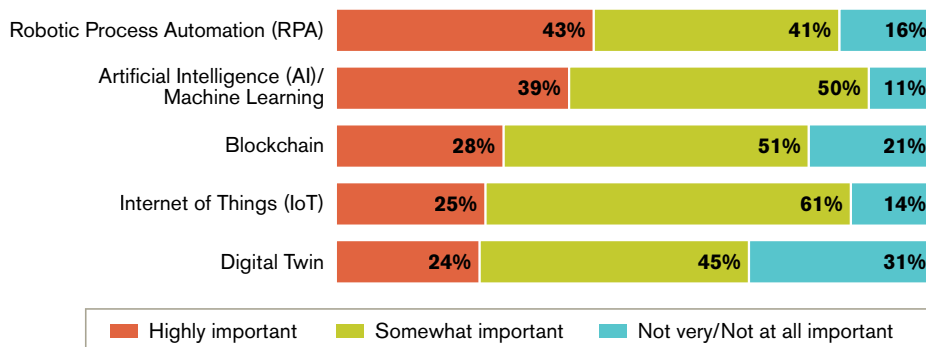
Figure 19

Though technologies such as AI and blockchain have low adoption rates among respondents, relatively high percentages see these emerging technologies as highly important in the near future.

Yet, many see these technologies rising in importance during the next two years (Figure 19). Results suggest that before adopting, decision-makers need more information on the benefits, or a better understanding of how vendors are leveraging these technologies as part of logistics solutions.

FIGURE 19

Importance of emerging technologies over the next 2 years



Respondents were asked to elaborate on business challenges they are seeking to address with these advanced technologies. The areas respondents hope to apply advanced technologies align with their leading logistics priorities, such as lowering costs and improving process efficiencies (Figure 20).

Figure 20

Commonly cited drivers for adopting emerging technologies include better visibility via IoT, predictive analysis through AI, and improved, more secure traceability from blockchain.

FIGURE 20

Key reasons for adopting emerging technologies

IoT	AI	Blockchain
Better integration	Automation implementation	Security
Improved process efficiency	Predictive analysis	Payment tracking
Real-time reporting	Data-driven decision-making	Greater visibility
Greater visibility	Shifting off-shore manufacturing to on-shore production	
Improved communication	Better inventory management	

Respondent comments on the value of emerging technologies include the following insights:

"With IoT, we gain true asset visibility, in-transit visibility, inventory location when under lease with the customer, unauthorized use of inventory by customers, and we gain the ability to accurately charge for use of inventory per customer."
Operations Manager – Manufacturing; Recycled packaging; \$100 - \$250 million in annual revenues

"We currently leverage artificial intelligence for product selection for our customers, and for better utilization of our available inventory when selecting subscription/gift boxes for customers."
Operations Manager – E-tailer; <\$50 million in annual revenues

Importance of the Cloud

With roughly 70% of respondents seeing cloud solutions as game-changing, significant, or reasonably effective at improving competitiveness, it's important to understand the reasons behind this. Some respondents offer valuable explanations as to why cloud technology promotes competitiveness.

Many of the benefits involve rapid implementation, as well as improved information access. According to one supply chain manager at a large automotive company with 2019 revenues of over \$2.5 billion:

"The cloud allows for solutions to be more easily adopted. We are able to more rapidly roll out applications both domestically and globally, and enable quicker access to global information."

Individual respondents also see the benefit in the near real-time nature of analytics and supply chain data provided by cloud solutions, compared to legacy approaches that involve lag time between data roll-ups, or issues with IT downtime that are locally managed systems. As one executive at a warehousing company stated:

"It's easier to capture real-time data between locations. There's also less likelihood of losing information due to a local event."

Other benefits respondents list include reduction in IT overhead and no obstacles in connecting automated equipment to cloud solutions. However, most comments came back to the notion of real-time data access and analytics. One operations manager at a mid-size (annual revenues of \$100 - \$250 million) industrial packaging company explained it this way:

"We are a global company working across multiple time zones. The cloud is the only way to stay real-time."

Conclusions

The survey clearly shows that supply chain professionals are dealing with some acute challenges in their logistics processes. They are highly concerned about their ability to control logistics costs and struggle with the lack of visibility into shipments. They know they must maintain high customer service levels, even as they try to curb costs and improve efficiencies.

Unfortunately, many respondents see their current level of capabilities as an obstacle in addressing their top logistics goals. Almost one-third of respondents, for example, struggle with shipment visibility, and 31% cite data analysis and reporting capabilities as problematic. In short, there is a gap between current capabilities in legacy systems and manual processes with what companies need to meet their top operational goals.

Fortunately, respondents see the value of cloud logistics solutions and technologies such as AI and blockchain as a means to attain a competitive advantage. While current adoption levels for cloud WMS, TMS, and GTM aren't high, many respondents using on-premise systems or manual methods generally are dissatisfied with their current capabilities and are evaluating cloud solutions. This points to a market that is primed to adopt cloud solutions that excel in areas like shipment visibility and advanced analytics. It's a case of respondent pain points aligning with the strengths of cloud applications.

Respondents see advanced technologies such as RPA, AI, and blockchain rising in importance over the next couple years, even if they have yet to adopt. This mirrors the positive outlook on advanced technologies found in other surveys of supply chain professionals, such as in [MHI's 2019 Industry Report](#)³. That MHI survey found, for instance, that 88% of respondents believe AI will allow an organization to manage risk and improve predictability. The MHI survey also noted that while blockchain and AI adoption are in early stages (10% and 13% respectively at the time of the survey), use of both is expected to accelerate quickly, reaching 62% in five years.

Logistics is reaching a tipping point for accelerated adoption of cloud solutions because of this alignment between top logistics challenges and respondent confidence in cloud applications as a source of competitive advantage. Supply chain professionals know they must continue to manage costs and maintain high levels of customer service, and they know their current capabilities can be a hindrance in achieving those goals. Cloud logistics solutions present a way to turn those obstacles into advantages.

Methodology

This research was conducted by Peerless Research Group (PRG) on behalf of *Supply Chain Management Review (SCMR)* and *Logistics Management (LM)* for Oracle Corporation. This study was executed in November/December 2019 and administered over the Internet to subscribers of *SCMR* and *LM*.

In total, 126 interviews were completed among high-ranking corporate, supply chain, operations, and logistics executives in manufacturing, retail, wholesale distribution, and warehousing organizations. On average, the companies surveyed report 2019 sales revenues of \$568.2 million. All respondents were prequalified for being involved in decisions regarding their organization's transportation, trade, warehousing, inventory, or any other logistics management-related function. Respondents were further screened for being employed with a company that ships goods, merchandise or raw materials.

¹ 2019 MHI Annual Industry Report, see Figure 5 on "company challenges," page 9.

<https://www.mhi.org/publications/report>

² "TMS Market Worth \$198.8 Billion by 2025," Grand View Research press release, June 2019. <https://www.grandviewresearch.com/press-release/global-transportation-management-system-market>

³ 2019 MHI Annual Industry Report, see page 3 charts with survey highlights.

<https://www.mhi.org/publications/report>

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